Installation and Maintenance Guide

HP OpenView Continuous Access Storage Appliance

Product Version: 5.7

Fourth Edition (May 2004)

Part Number: AA–RTD6D–TE

This guide describes how to install, configure, and maintain the HP OpenView Continuous Access Storage Appliance (CASA), which uses two ProLiant servers.

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Continuous Access Storage Appliance Installation and Maintenance Guide
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about this guide

This guide provides information to help you:

- Identify the shipment contents.
- Understand the tasks that HP Manufacturing completes before shipping the Continuous Access Storage Appliance (CASA).
- Complete the appliance setup in a customer environment.
- Configure the hosts and storage arrays connected to the appliance.
- Wire the appliance.
- Replace and reconfigure appliance components.
- Reinstall the current version of the appliance software.
- Understand how to implement appliance features.
- Identify the physical and technical specifications of each appliance component.
- Interpret SNMP traps and DPF error codes.
- Identify and use the command line interface (CLI) commands reserved for HP service and support personnel.

"About This Guide" describes the following topics:

- Overview, page 10
- Conventions, page 11
- Rack stability, page 13
- Getting help, page 14

Overview

This section describes the following topics:

- Intended audience
- Related documentation

Intended audience

This guide is intended for HP authorized service and support personnel. Readers should be familiar with the Continuous Access Storage Appliance (CASA), as well as:

- Storage area network (SAN) fabric configurations
- Host operating systems
- Storage systems

Related documentation

Refer to the following documentation for more information about the Continuous Access Storage Appliance:

- *HP OpenView Continuous Access Storage Appliance Command Line Interface Reference Guide*
- *HP OpenView Continuous Access Storage Appliance Release Notes*
- *HP OpenView Continuous Access Storage Appliance System Administrator's Guide*
- HP OpenView Continuous Access Storage Appliance Online Help

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Note: Do not load the documentation onto the appliance nodes. You must access the documentation from another machine.

Conventions

Conventions consist of the following:

- Document conventions
- Text symbols
- Equipment symbols

Document conventions

This document follows the conventions in Table 1.

Table 1: Document conventions

Convention	Element
Blue text: Figure 1	Cross-reference links
Bold	Menu items, buttons, and key, tab, and box names
Italics	Text emphasis and document titles in body text
`Monospace font`	User input, commands, code, file and directory names, and system responses (output and messages)
`Monospace, italic font`	Command-line and code variables
Blue underlined sans serif font text (http://www.hp.com)	Web site addresses

Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Tip: Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment symbols

The following equipment symbols may be found on hardware to which this guide pertains. They have the following meanings:

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack stability

Rack stability protects personnel and equipment.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- In single rack installations, the stabilizing feet are attached to the rack.
- In multiple rack installations, the racks are coupled.
- Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: http://www.hp.com.

HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: http://www.hp.com/support/. From this web site, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed questions

HP storage web site

For additional support information, access any of the following links:

- Cybrary
  http://cybrary.inet.cpqcorp.net/HW/STOR/SOLUTIONS/SV3000/index.html
- Support Team Link
  http://invent.atl.hp.com/storage/svs/svs.htm
- Learn @hp (Register to attend the HP OpenView Continuous Access Storage Appliance (CASA) Service and Support class–catalog code 8238.)
  http://learn.hp.com/

HP authorized reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the HP web site for locations and telephone numbers: http://www.hp.com.

Unpacking the Appliance

1

HP Manufacturing ships the appliance components in one of two ways:

- Preinstalled in the standard HP rack.
- Packaged in separate boxes. You must install the appliance components in the rack that the customer is using.

This chapter describes the following topics:

- Shipment contents, page 16
- Identifying the node components, page 18
- Connecting the nodes and the shared storage array, page 20
- What to do next, page 21

Shipment contents

The shipment contents contain the following items (see "Appliance Components" on page 137 for detailed specifications):

- **Nodes**
  - Two ProLiant ML370G3 servers with the following components:
    - Two standard–bracket, dual–port HP/Intel Gigabit Ethernet cards (PWLA8492MTG1P20, MM# 844154)
    - Six QLogic 2344F four–port full–profile host bus adapters (HBAs)
- **Peer node storage**
  - One HP StorageWorks Virtual Array, model 7110 (VA7110)—dual–controller, 1024MB cache
  - Five 36GB 15Kb drives FC HDD
  - Rail kit
  - NT/Rittal rail kit
- **Rack accessories**
  - One integrated keyboard and monitor (J1470A or TFT5600RKM)
  - One console switch
  - Two 8 foot console switch cables
  - One third-party rail kit (for the TFT5600RKM keyboard/monitor only)
  - Four 16A power distribution units (PDUs) (North American preinstalled version only)
  - Two NEMA L6–20 connectors (North American preinstalled version only)
- **Other accessories**
  - One hp OpenView nameplate
  - One plastic–backing nameplate (HP rack only)
  - Four solution serial number labels
- **Cables**
  - Two 2m FC cables (LC-LC)
  - One 7 foot Ethernet crossover cable (CAT5 RJ–45)
- **Software**
  - Two Windows 2000 Server access licenses

Note: For all international installations (preinstalled and packaged) and North American packaged installations, determine the customer's power requirements before installation to ensure you are using the proper equipment. For more information, refer to the *Continuous Access Storage Appliance PDU Requirements* document posted on Cybrary: http://cybrary.inet.cpqcorp.net/HW/STOR/SOLUTIONS/SV3000/index.html .

Preinstalled version

The preinstalled version of the appliance is shipped as one unit with all components installed in the rack.

HP Manufacturing completes the following tasks before shipping the appliance:

- On the appliance nodes:
  - Installs the appliance software (SANOS).
  - Installs and configures the Gigabit Ethernet card and the QLogic HBAs.
  - Disables the Automatic Server Recovery and Automatic Server Restart parameters. (See "Disabling Automatic Server Recovery" on page 32 for more information.)
  - Runs the CASA Setup Utility. Specifies the node name and the solution serial number for the appliance, as well as the default network values.
  - Deletes all information in the log files.
  - Stops all software services. (See "Stopping the software services" on page 44 for more information.)
- Configures the VA7110 array and creates the partitions.
- Connects the cable (the InterLink) between the nodes.
- Connects the cables between each node and the VA7110 array.
- Connects the keyboard cable and the monitor cable to the console switch. HP Manufacturing does *not* connect the cables between the console switch and the nodes before shipment.
- Positions the power cables and ties them to the rack.

Packaged version

With the packaged version, you are responsible for unpacking the shipment and installing the components in a rack.

HP Manufacturing completes the following tasks before shipping the appliance:

- On the appliance nodes:
  - Installs the appliance software (SANOS).
  - Installs and configures the Gigabit Ethernet card and the QLogic HBAs.
  - Disables the Automatic Server Recovery and Automatic Server Restart parameters. (See "Disabling Automatic Server Recovery" on page 32 for more information.)
  - Runs the CASA Setup Utility. Specifies the node name and the solution serial number for the appliance, as well as the default network values.
  - Deletes all information in the log files.
  - Stops all software services. (See "Stopping the software services" on page 44 for more information.)
- Configures the VA7110 array and creates the partitions.

Use the third-party rail kit included in the shipment to install the nodes, VA7110 array, and monitor and keyboard in the rack. For instructions, refer to the rail kit installation guide included in the shipment.

Identifying the node components

Figure 1 lists the node components, including the location of the initiator and target ports:

- Dual–port Gigabit Ethernet card (**1**)
  - Port A—MirrorLink
  - Port B—InterLink
- Four–port HBA card (**2**)
  - Port 0—Target 2
  - Port 1—Target 3
  - Port 2—Initiator 2
  - Port 3—Initiator 3
- Four–port HBA card (**3**)
  - Port 0—Target 4
  - Port 1—Target 5
  - Port 2—Initiator 4
  - Port 3—Initiator 5
- Four–port HBA card (**4**)
  - Port 0—Target 0
  - Port 1—Target 1
  - Port 2—Initiator 0 (shared disk connection)
  - Port 3—Initiator 1
- USB connectors (**5**)
- Unit ID switch and LED (**6**)
- Auxiliary VHDCI SCSI blank (**7**)
- Serial connector A (**8**)
- Mouse connector (**9**)
- Keyboard connector (**10**)
- Serial connector B (**11**)
- Primary hot-pluggable power supply (**12**)
- Video connector (**13**)
- Parallel connector (**14**)
- iLO management port (**15**)
- Ethernet 10/100/1000 port (**16**)
- VHDCI SCSI port 2 connector (**17**)
- Redundant hot-pluggable power supply (**18**)

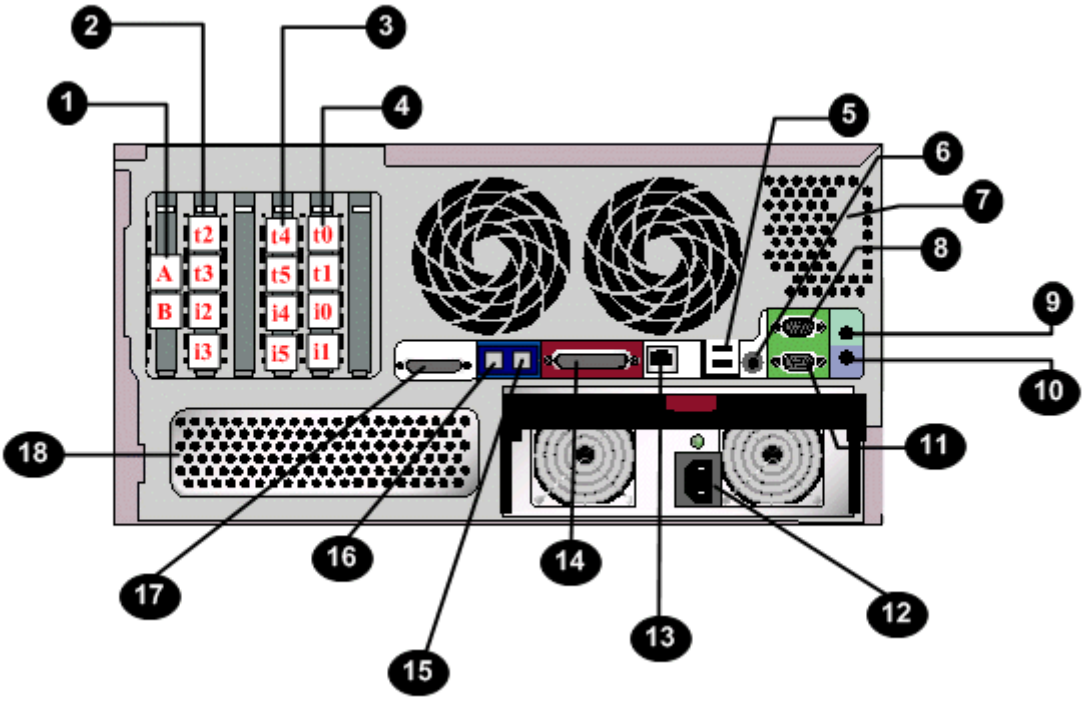


Figure 1: Node components (rear view)

Connecting the nodes and the shared storage array

If you are installing the packaged version, connect the nodes to the shared storage array (Figure 2). HP Manufacturing completes these connections on the preinstalled version before shipment.

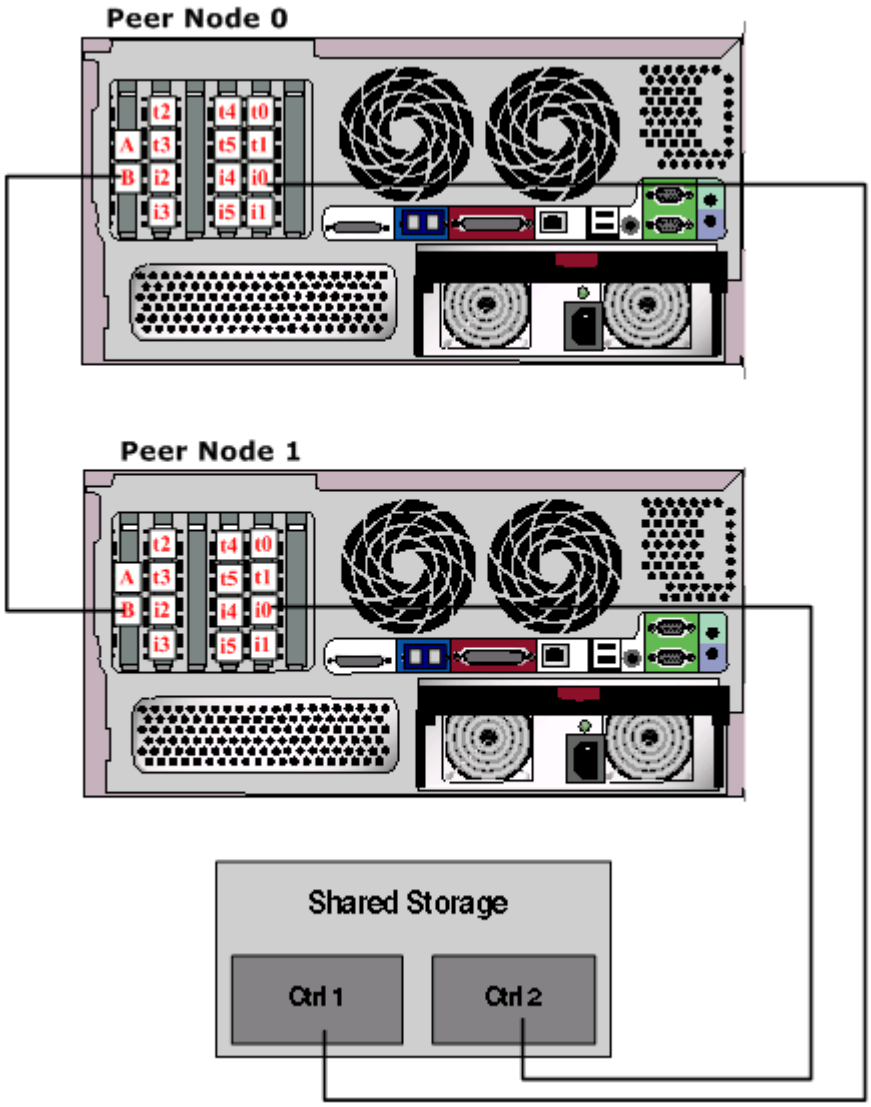


Figure 2: Connecting the nodes and the shared storage array

What to do next

After you unpack the appliance:

1. Connect all cables on the appliance.
2. Power on the appliance.
3. Set the current date and local time on the nodes (and switches, if applicable). (See "Setting the current date and local time" on page 31.)
4. Set the network properties using the CASA Setup Utility. (See "Setting network properties" on page 42.)
5. Initialize the user database to authenticate the user interface and the command line interface (CLI). (See "Initializing the user database" on page 48.)
6. Configure the hosts and storage arrays that you connect to the appliance. (See "Configuring Hosts and Storage Arrays" on page 53.)
7. Implement path failover, if applicable. (See Implementing Path Failover on page 69.)
8. Complete the wiring between the appliance and the hosts and storage arrays. (See "Connecting the Appliance to Hosts and Storage Arrays" on page 81.)

Completing the Appliance Setup

2

This chapter describes how to complete the appliance setup after unpacking the appliance. It describes the following topics:

- Navigating the CASA console, page 24
- Setting the current date and local time, page 31
- Disabling Automatic Server Recovery, page 32
- Identifying the network connections, page 33
- Setting network properties, page 42
- Starting the software services, page 47
- Initializing the user database, page 48
- Downloading and installing diagnostic software, page 50
- What to do next, page 52

Navigating the CASA console

When you first power on the appliance monitor, the **hp OV CASA Console** window for the current node opens in viewer mode (Figure 3). Customers can only use the console in viewer mode.

The CPU, MEM, and NET indicators are updated dynamically and indicate the status of the node's central processing unit, memory, and network activity, respectively. The current time is displayed automatically. Click the time to display the date.

This section describes the following topics:

- Viewer mode
- Administrative mode
- Known console window issues
- Setting the console display

Viewer mode

In viewer mode, the **hp OV CASA Console** window contains the following options:

- **status**—View the worldwide names of the appliance node's initiator ports and the status of the network interface card (NIC) ports, power supplies, and CPU fan.
- **node**—Display the appliance node's ID number (either 0 or 1) of the appliance node.
- **system info**—Display the appliance node's available disk space and memory, uptime, and IP address.
- **CASA info**—Display the SANOS software, management software, and HTTP server software versions installed on the appliance node.
- **date**—Display the date and time on the appliance node.
- **sanos admin**—Access `sanosadmin`, the appliance's command line interface. Click **Initialize** to create an administrative user. Click **Launch** to open `sanosadmin`.
- **event viewer**—Access application logs, security logs, and system logs.
- **log viewer**—Display details about the appliance software.
- **backup\restore**—Back up or restore the appliance configuration.
- **shutdown**—Shut down or restart the appliance node.

Refer to "Using the Interfaces" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information about the console window menu options.

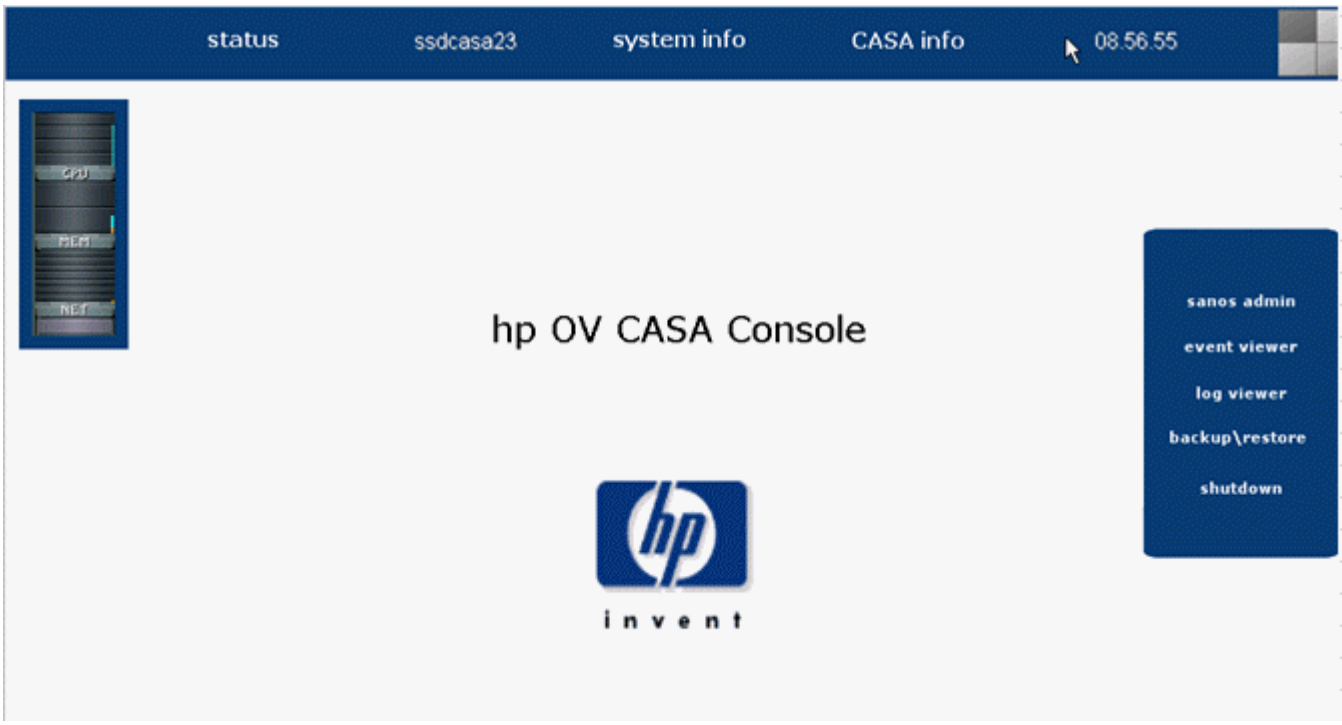


Figure 3: hp OV CASA Console window (viewer mode)

Administrative mode

In administrative mode, the **hp OV CASA Console** window includes the viewer mode options, as well as the following options:

- **service viewer**—Display and manage the software services running on the appliance node.
- **setup**—Open the **CASA setup utility** window to set network properties.
- **switchui**—Switch the console display to the Windows NT desktop. (See "Using switchui" on page 28 for more information.)
- **logoff**—Log off the appliance node.

Note: Only HP personnel can use administrative mode. Do not share this information with anyone outside HP.

This section describes the following topics:

- Accessing administrative mode
- Using switchui
- Using the Force appliance reboot check box
- Using a command prompt window

Accessing administrative mode

To access administrative mode:

1. When the **hp OV CASA Console** window is open in viewer mode, press **Ctrl+Alt+Shift+Esc**.
2. At the password prompt, enter `adm` and click **OK**.

   The **hp OV CASA Console** window opens in administrative mode (Figure 4).

To return to viewer mode:

1. Press **Ctrl+Alt+Shift+Esc**.

   The following prompt is displayed:

   ```
   Exiting Administrative mode, click YES to continue.
   ```

2. Click **Yes**.

   The **hp OV CASA Console** window opens in viewer mode.

Figure 4: hp OV CASA Console window (administrative mode)

Using switchui

To switch from the console window to the Windows NT desktop:

1. When the **hp OV CASA Console** window is open in administrative mode, click **switchui**.

   The **CASA Switch UI Utility** dialog box opens (Figure 5).
2. Select the **Force appliance reboot** check box, if applicable. (See "Using the Force appliance reboot check box.")
3. Click **Yes**.

   The Windows NT desktop opens.
4. If you click **No**, the operation is cancelled and the console window opens in administrative mode.

Note: If you click **Start > Shut Down > Restart** on the desktop to reboot the appliance node, the Windows NT desktop opens when the node reboots.

To return to the **hp OV CASA Console** window:

1. Press **Alt+C** to open a command prompt window.
2. Enter one of the following commands:

   ```
   ramcli syst switchsh casa
   ```

   ```
   switchui
   ```
3. If you use the `switchui` command, the **CASA Switch UI Utility** dialog box opens. Click **Yes** to continue.

   The **hp OV CASA Console** window opens in viewer mode.

Note: If you click **shutdown > restart** on the console window to reboot the appliance node, the console window opens in viewer mode when the node reboots.

Using the Force appliance reboot check box

The **Force appliance reboot** check box is an option on the **CASA Switch UI Utility** dialog box (Figure 5). Select this check box to reboot the appliance node *before* you switch from the console window to the Windows NT desktop (or vice versa). Rebooting the appliance node updates the registry and ensures that all applications function properly in the console window or the Windows NT desktop. For example, if an application is running when you switch to the Windows NT desktop, and you do *not* select this option, the application will no longer work because it is pointing to the console window.

You can also use the **Force appliance reboot** check box when installing applications that require a manual reboot.

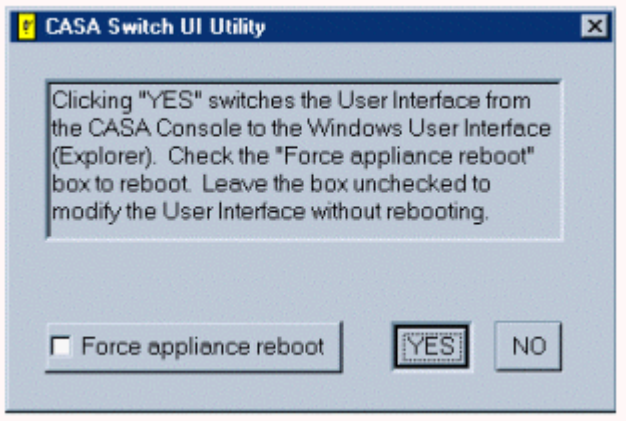

CASA Switch UI Utility
Clicking "YES" switches the User Interface from the CASA Console to the Windows User Interface (Explorer). Check the "Force appliance reboot" box to reboot. Leave the box unchecked to modify the User Interface without rebooting.
Force appliance reboot
YES
NO

Figure 5: CASA Switch UI Utility dialog box

Using a command prompt window

Throughout this guide, always use a command prompt window when instructed. Do *not* use Windows Explorer.

Known console window issues

The console window issues are as follows:

- If you open the **Control Panel** window from a command prompt window, the system displays the following error message:

  ```
  Cannot find the file '(null') (or one of its components).
  Make sure the path and filename are correct and that all
  required libraries are available.
  ```

- You cannot change service login information using the **service viewer** option in the console window. To change service login information from the **NT Services** window:

  a. Ensure the console window is set to administrative mode.

  b. Press **Alt+C** to open a command prompt window.

  c. At the `c:\` prompt, enter:

  ```
  control
  ```

  d. Click **services** to open the **NT Services** window.

Setting the console display

To set the console display to node 0 or node 1, do one of the following:

- If the appliance keyboard and monitor has the part number TFT5600RKM, press **Print Screen** once.
- If the appliance keyboard and monitor has the part number J1470A, press **Ctrl** twice.

A selection window opens, listing the devices connected to the appliance. Use the arrow keys to select an appliance node and press **Enter**. The **hp OV CASA Console** window for the selected node opens.

Setting the current date and local time

HP Manufacturing does not set the current date or local time before shipping the appliance. After you power on the appliance nodes, check the date and time on each node. Verify with the customer that the date and time reflect the correct time zone. Having the correct date and time is helpful when generating logs to troubleshoot issues.

To view or set the the current date and time on the appliance nodes:

1. Set the console display to node 0.

   The **hp OV CASA Console** window opens.
2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Press **Alt+C** to open a command prompt window.
4. At the `c:\` prompt, enter `date` and press **Enter**.

   The system displays the current date. You can change the date if necessary.
5. At the `c:\` prompt, enter `time` and press **Enter**.

   The system displays the current time. You can change the time if necessary.
6. Set the console display to node 1 and repeat steps 2 through 5.

Note: If switches are connected to the appliance, verify the date and time on each switch.

Disabling Automatic Server Recovery

HP Manufacturing installs the ProLiant management agents on the appliance nodes before shipping the appliance. However, installing these agents may result in unexplained, intermittent reboots. To prevent these reboots, HP Manufacturing also disables the Automatic Server Recovery (ASR) parameter prior to shipment.

To disable Automatic Server Recovery:

1. While the node is booting up, press **F9**.

   The BIOS options window opens.
2. Use the arrow keys to highlight **Automatic Server Recovery** and press **Enter** to select it.

   The Automatic Server Recovery options are displayed.
3. Highlight **ASR Status** and press **Enter**.
4. Select **Disable** and press **Enter**.
5. Highlight **Thermal Shutdown** and press **Enter**.
6. Select **Disable** and press **Enter**.
7. Press **Esc** and then press **F10**.

Identifying the network connections

This section identifies the hardware and software ports on the nodes and describes how to manage access to these ports. It describes the following topics:

- Hardware ports
- Software ports
- Managing remote access to ports

Hardware ports

Each appliance node has three network interface ports, which operate as follows (Figure 6):

- **LAN Interface**—This interface establishes the network connection between the customer's local LAN and each appliance node; it is also called the Management Link. Use the LAN Interface to connect to the management software through the customer's web browser. The LAN Interface should be on a public network.
- **InterLink**—This interface establishes the Gigabit Ethernet connection between the peer nodes; it is also called the heartbeat link. The peer nodes communicate through this link and are connected by a crossover cable. The InterLink must be on a private network.
- **MirrorLink**—This interface establishes the Gigabit Ethernet connection between the local and remote appliance nodes. The MirrorLink is used for IP mirroring only and must be on a private network. (Refer to "Managing IP Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.)

Note: The LAN Interface, InterLink, and MirrorLink must not use the same network.

Because each port has a specific purpose, the TCP/IP protocol requires that each port have a unique network number. The network number is derived from the class and subnet of the IP address. For more information about classes and subnets, refer to your TCP/IP documentation.

You specify network information for each port using the **CASA setup utility** window. See "Setting network properties" on page 42 for more information.

For information about using static routes, refer to "Managing IP Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide*.

Note: If the customer wants to use domain name service (DNS), be sure to specify a unique name for each network connection.

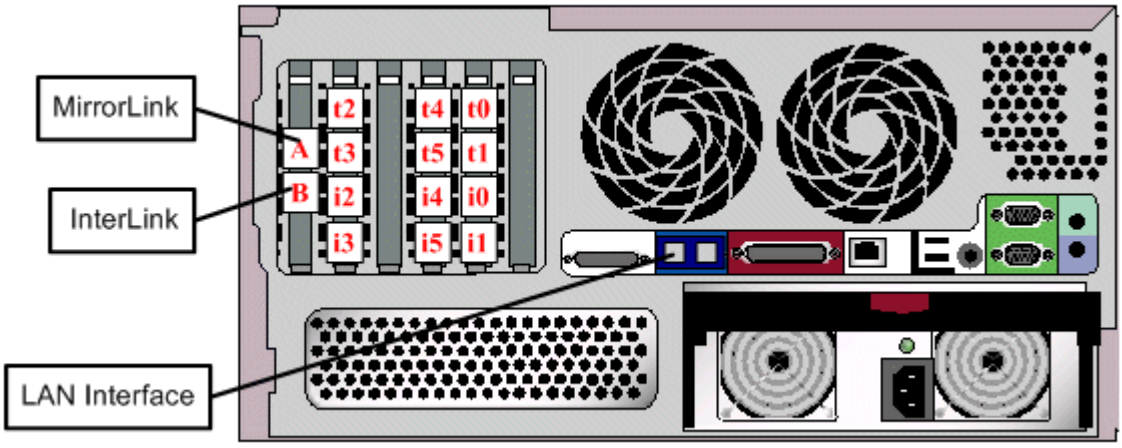


Figure 6: Network interface ports on the node

Software ports

The appliance has several software ports. The customer's network administrator must modify the local name–to–port–number tables to include the port names and numbers listed in Table 2. The network administrator must have these names to open the ports in the firewall and allow IP mirror traffic to flow through the network. The network administrator should refer to the firewall documentation to determine how to open these ports for external access. To allow external access to the appliance user interface, the network administrator should open TCP port 80 in the firewall.

Table 2 lists the software port information.

Table 2: Software port information

Port name	Port number/protocol	Description
CASA_FAILOVER_PORT	4051/TCP	Enables peer nodes to share failover information
CASA_HLTH_PORT	2001/UDP	Monitors the heartbeat between local and remote nodes
CASA_MANAGE_1	10340/TCP	Carries management traffic between local and remote nodes
CASA_MANAGE_2	10350/TCP	Carries management traffic between local and remote nodes
CASA_MANAGE_PORT	4050/TCP	(For peer nodes on the local appliance) Sends information from the management software to SANOS, which is the appliance software
CASA_MIRROR_PORT	4099/TCP	Carries IP mirror traffic between local and remote nodes
CASA_PROXY_MIRROR_PORT	4098/TCP	Carries IP mirror traffic between peer nodes

Managing remote access to ports

This section describes the following topics:

- List of network ports
- Configuring remote access

List of network ports

To protect the appliance nodes from viruses, HP Manufacturing sets the port access for the ethernet adapters on the appliance nodes before shipping the appliance. Table 3 lists the relevant ports, including the application or service that uses the port, the port protocol, the port number, and the access type (enabled or disabled).

Do not change the access type for those ports labeled "(do not change)" because it may cause the appliance components to function improperly.

Table 3: Network ports

Application	Protocol	Port number	Remote access
Apache			
	TCP	80	Enabled; can disable and require browser access using SSL on port 443 (optional)
	TCP	443	Enabled
	TCP	1512	Enabled
Identification and Authorization (INA) service			
	TCP	10350	Enabled
Java			
	TCP	8007	Enabled
	TCP	8009	Enabled
	TCP	8080	Enabled
RPCSS			
	UDP	135	Disabled
	TCP	135	Disabled
	TCP	1025	Disabled
	TCP	1237	Disabled
	TCP	1238	Disabled

Table 3: Network ports

Application	Protocol	Port number	Remote access
RPIC Data Propagation Framework (DPF) service			
	UDP	1028	Enabled (do not change)
	UDP	1029	Enabled (do not change)
	UDP	2001	Enabled (do not change)
	TCP	1030–1233	Enabled (do not change)
	TCP	4050	Enabled (do not change)
	TCP	4051	Enabled (do not change)
	TCP	4098	Enabled (do not change)
	TCP	4099	Enabled (do not change)
	TCP	kpop	Enabled (do not change)
Secure Path agent			
	TCP	securepath	Enabled (do not change)
	TCP	4987	Enabled (do not change)
	TCP	4998	Enabled (do not change)
SNMP			
	TCP	11111	Enabled (do not change)
	UDP	161	Enabled (do not change)
	UDP	162	Enabled (do not change)
	UDP	1235	Enabled (do not change)
	UDP	1236	Enabled (do not change)
	UDP	1237	Enabled (do not change)
	UDP	snmp	Enabled (do not change)
sv3000 Management Server (SMS) service			
	TCP	1247	Enabled
	TCP	1249	Enabled
	TCP	10340	Enabled

Table 3: Network ports

Application	Protocol	Port number	Remote access
System			
	TCP	137	Enabled (do not change)
	TCP	138	Disabled
	TCP	161	Disabled
	TCP	1029	Disabled
	TCP	1028	Disabled
	TCP	1235	Disabled
	TCP	1236	Disabled
	TCP	1237	Disabled
	TCP	1671	Disabled
	TCP	1678	Disabled
	TCP	1770	Disabled
	TCP	2001	Disabled
	TCP	nbsession	Disabled
	UDP	137	Enabled (do not change)
	UDP	nbdatagram	Disabled
	UDP	nbname	Disabled

Configuring remote access

If corruption occurs and you need to configure remote access for the ports, you can:

- Reset security for all ports. (See "Resetting security for all ports.")
- Manually configure access for individual ports. (See "Manually configuring port access.")

Resetting security for all ports

To reset security for all ports listed in Table 3:

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui** to open the Windows NT desktop. See "Using switchui" on page 28 for instructions.
3. Click **Start > Settings > Control Panel**.

   The **Control Panel** window opens.
4. Double-click **Network**.

   The **Network** window opens.
5. Double-click **Protocol**.

   The **Protocol** window opens.
6. Select **TCP/IP** and click **Properties**.

   The **Properties** dialog box opens.
7. Click **Advanced**.

   The **Advanced** dialog box opens.
8. Click **Configure** in the **Enable security** box.
9. Under TCP and UDP, select the **Permit All** options.
10. Exit all windows and reboot the appliance node when prompted.
11. Press **Alt+C** to open a command prompt window.
12. To reset port security on the appliance node, enter the following command:

    ```
    c:\rpic\utilites\SetPortSecurity E10001
    ```

Manually configuring port access

To manually configure port access:

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui** to open the Windows NT desktop. See "Using switchui" on page 28 for instructions.
3. Click **Start > Settings > Control Panel**.

   The **Control Panel** window opens.
4. Click **Network**.

   The **Network** dialog box opens (Figure 7).
5. Click the **Protocols** tab, click **TCP/IP Protocol**, and then click **Properties**.

   The **Microsoft TCP/IP Properties** dialog box opens (Figure 8).
6. Select the LAN Interface adapter in the **Adapter** list and click **Advanced**.

   The **Advanced IP Addressing** dialog box opens (Figure 9).
7. Click the **Enable Security** check box, which enables the **Configure** button.
8. Click **Configure**.

   The **TCP/IP Security** dialog box opens (Figure 10).
9. Add and set access to the specific ports, using the information in Table 3.

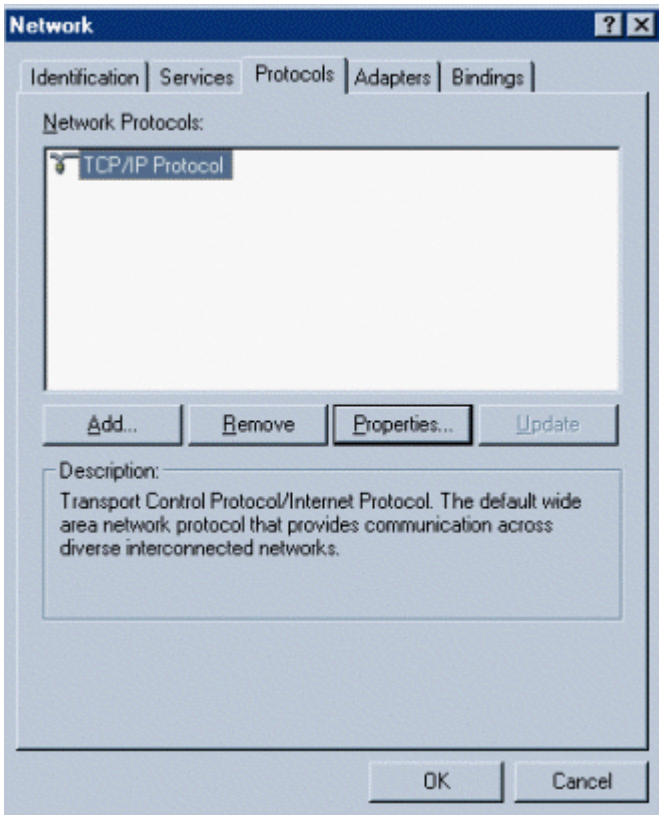


Figure 7: Network dialog box

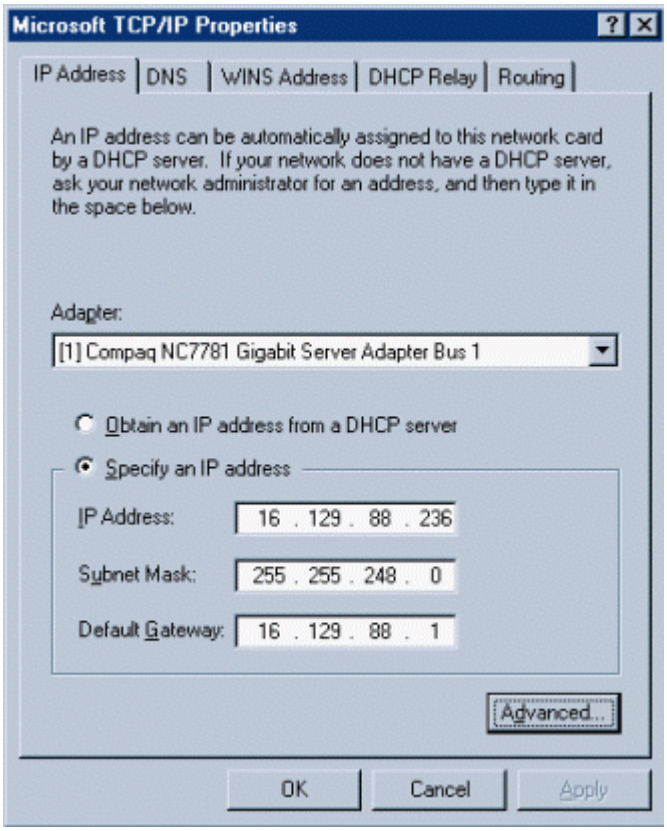

Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
DHCP Relay
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Compaq NC7781 Gigabit Server Adapter Bus 1
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
16 . 129 . 88 . 236
Subnet Mask:
255 . 255 . 248 . 0
Default Gateway:
16 . 129 . 88 . 1
Advanced...
OK
Cancel
Apply

Figure 8: Microsoft TCP/IP Properties dialog box

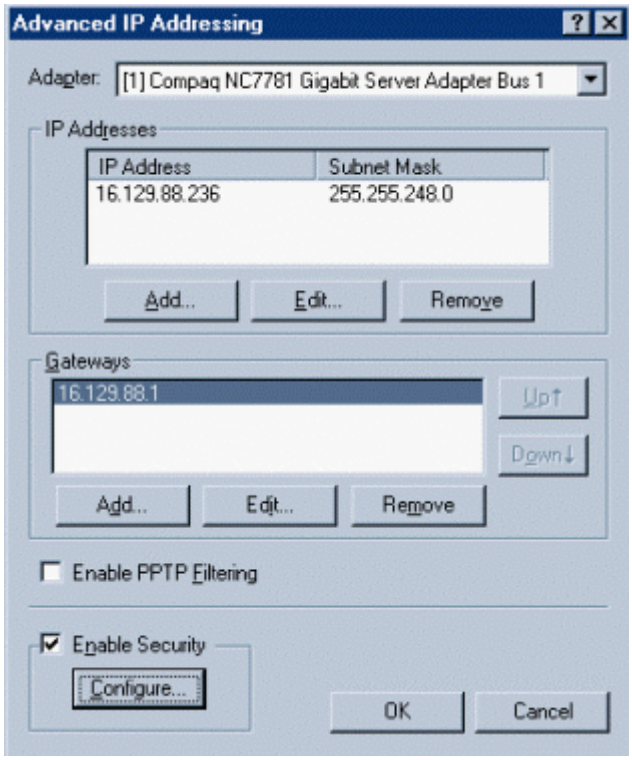


Figure 9: Advanced IP Addressing dialog box

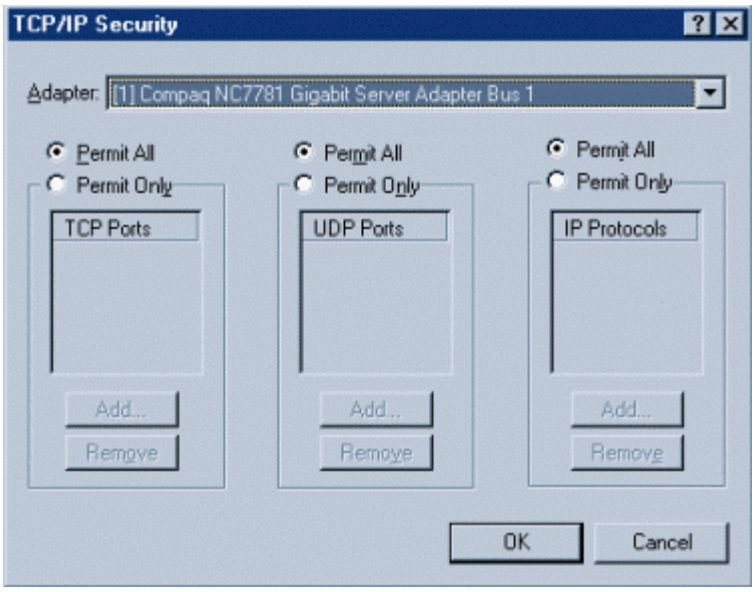


Figure 10: TCP/IP Security dialog box

Setting network properties

Before shipping the appliance, HP Manufacturing enters information for each appliance node using the **CASA setup utility** window. This information enables the appliance nodes to identify and communicate with each other. Table 4 lists the information entered for node 0; Table 5 lists the information entered for node 1.

At the customer site, you must update the LAN Interface network information. If the customer uses IP mirroring, you must also update the MirrorLink network information. You do not have to change the InterLink information.

HP Manufacturing generates the serial ID, which has the following format:

- **CC**—Country code
- **S**—Site code
- **YY**—Last two digits of the year (04, 05)
- **WW**—Two digits representing the week (01–52)
- **XXX**—Sequence number

The same serial ID is used for both appliance nodes.

Note: The previous serial ID format, which included the prefixes **usra** and **usrb**, will work in the **CASA setup utility** window to accommodate older installations.

Table 4: Settings for node 0

Field	Value
Peer Node General – Settings	
Host name	Node 0
Node id	0
Serial id	CCSYYWWXXX
Peer IP address	10.0.1.2
LAN Interface	
IP Address	10.100.70.130
Subnet Mask	255.255.255.0
Default Gateway	10.100.70.1
MirrorLink	
IP Address	10.0.2.1
Subnet Mask	255.255.255.0
Default Gateway	blank
InterLink	
IP Address	10.0.1.1
Subnet Mask	255.255.255.0
Default Gateway	blank

Table 5: Settings for node 1

Field	Value
Peer Node General – Settings	
Host name	Node 1
Node id	1
Serial id	CCSYYWWXXX
Peer IP address	10.0.1.1
LAN Interface	
IP Address	10.100.70.131
Subnet Mask	255.255.255.0
Default Gateway	10.100.70.1
MirrorLink	
IP Address	10.0.2.2
Subnet Mask	255.255.255.0
Default Gateway	blank
InterLink	
IP Address	10.0.1.2
Subnet Mask	255.255.255.0
Default Gateway	blank

Stopping the software services

The software services are:

- **Identification and Authorization Server (INA)**—Performs the security operations for the appliance.
- **RPIC DPF**—Performs all tasks (other than security) for the appliance. RPIC DPF is the core component of the appliance software.
- **sv3000 Management Server (SMS)**—Serves as an interface to the Data Propagation Framework (DPF).
- **Tomcat**—Executes Java server pages (JSPs) and Java servelets for the appliance's web server.
- **VA Status Monitor (VSM)**—Polls the shared storage array to determine its operating condition. To use this service, all other software services must be active.
- **WebServer**—Enables the appliance node to act as a web server.

Before shipping the appliance, HP Manufacturing completes the following steps:

1. Stops all software services.
2. Sets the RPIC DPF service to **Manual**.
3. Sets all other services to **Automatic**.

When you boot each node, all services, except RPIC DPF, start automatically.

Before you open the **CASA setup utility** window, stop the software services as follows:

1. Set the console display to node 0.

   The **hp OV CASA Console** window opens.
2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Click **service viewer**.

   The **Services** window opens.
4. Select a software service from the list.
5. Click **Stop**. Verify that the status of the service is Inactive, which means it has stopped.
6. Repeat steps 4 and 5 for each software service.
7. When finished, close the **Services** window.
8. Set the console display to node 1 and repeat steps 2 through 7.

Running the CASA setup utility

To run the CASA setup utility:

1. Set the console display to node 0.

   The **hp OV CASA Console** window opens.

2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Click **setup**.

   The **CASA setup utility** window opens (Figure 11).

4. Do either of the following:

   - If the **Peer Node Settings - General** box is populated with values, do not change the IP address in the **Peer IP Address** box. This IP address corresponds to the network information in the **InterLink (Bottom Port)** box.
   - If the **Peer Node Settings - General** box is not populated with values, **do not** specify the customer's LAN in the **Peer IP Address** box. Use the Peer IP address specified in Table 4 on page 42, which corresponds to the InterLink connection between the nodes. InterLink traffic should not be directed over the customer's LAN.

5. Enter the customer's public network information in the **LAN Interface - Onboard NIC # 1** box.
6. If the customer uses IP mirroring, enter the MirrorLink network information in the **MirrorLink (Top Port)** box.

   If the customer is not using IP mirroring, you can accept the default values or set the IP address to `0.0.0.0`.

7. Click **OK**.
8. Reboot node 0.
9. Set the console display to node 1 and repeat steps 2 through 7 on node 1.

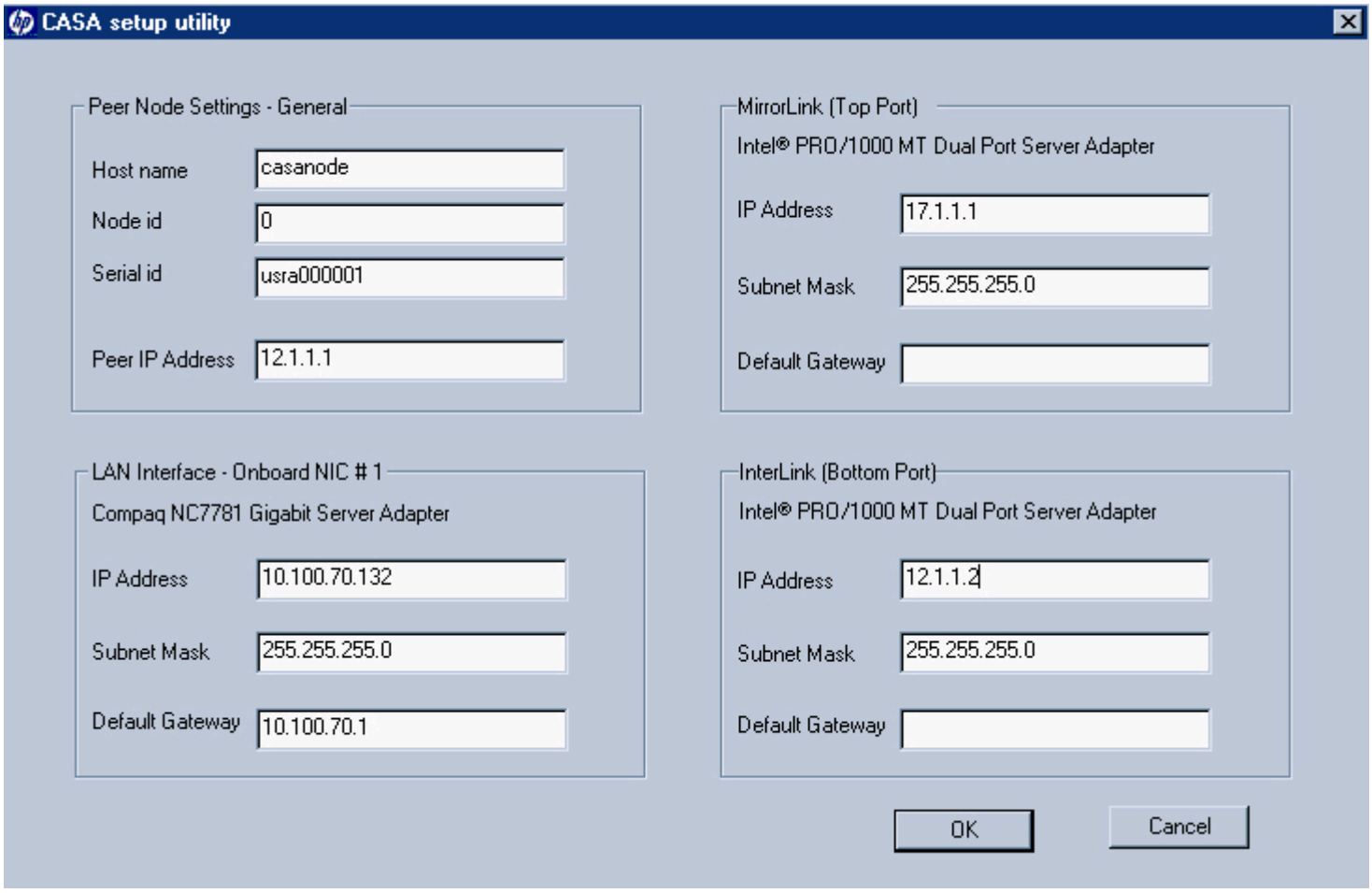


Figure 11: CASA setup utility window

Starting the software services

To start the software services:

1. Set the console display to node 0.

   The **hp OV CASA Console** window opens.
2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Click **service viewer**.

   The **Services** window opens.
4. Select the **RPIC DPF** service and set it to **Automatic**.
5. Click **Apply** and then click **Start**.

Note: It may take a few minutes for the RPIC DPF service to start.

---

6. Select each of the following services and verify that they are set to Automatic and that the status is Active. If a service is not set to Automatic and the status is not Active, repeat steps 4 and 5.
   - Identification and Authorization Server
   - sv3000 Management Server (SMS)
   - Tomcat
   - VA Status Monitor
   - WebServer
7. Close the **Services** window.
8. Set the console display to node 1 and repeat steps 2 through 7 on node 1.

Initializing the user database

Before you or the customer can manage the appliance using the command line interface (CLI) or the user interface, you must initialize the user database by completing the following procedures in the order shown:

- Creating the initial administrator account
- Initializing the services
- Updating HBA information

Creating the initial administrator account

To create the initial administrator account on the appliance nodes:

1. Set the console display to node 0.

   The **hp OV CASA Console** window opens.

2. Click **sanos admin > initialize**.

   The `sanosadmin` window opens.

3. Ask the system administrator for a user name and password to create an administrator account. The system administrator must use the chosen user name and password to manage the appliance and create other user accounts.

4. When prompted, enter the user name and password (enter the password twice).

   The `sanosadmin` prompt is displayed.

5. Set the console display to node 1.

6. Repeat steps 2 through 4. For step 4, enter the same user name and password you specified on node 0.

   After you create the administrator account, all future accounts that you or the system administrator create on one node are automatically propagated to the other node.

Initializing the services

The next procedure for initializing the user database is to initialize the following services:

- `slsnmp`—Gathers information from the SMS service and formats it for SNMP
- `slsemi`—Enables HP software products to identify HP hardware and gather information about HP products
- `slstat`—Gathers statistics from the SMS service for LUNs connected to the appliance

---

Note: You must perform the following steps in the order shown to ensure that the `slsnmp`, `slsemi`, and `slstat` services are synchronized in both nodes' databases.

Continuing from step 6 in "Creating the initial administrator account:"

1. At the `sanosadmin` prompt on node 1, enter the following command (no space before or after the comma):

   ```
   initservice slsnmp,slsemi,slstat
   ```

2. When prompted, select the **guest** role for these services.
3. Switch to node 0.
4. At the `sanosadmin` prompt, repeat steps 1 and 2 on node 0.

Updating HBA information

The last procedure for initializing the user database is to update the nodes' HBA information.

Continuing from step 4 in "Initializing the services:"

1. At the `sanosadmin` prompt on node 0, enter the following command to update the subvendor IDs on the node's HBAs:

   ```
   mod hba -updatehbas
   ```

2. Reboot node 0.

   After node 0 reboots, the **hp OV CASA Console** window opens in viewer mode.

3. Click **sanos admin > launch** from the console window of node 0 to open `sanosadmin`.
4. When prompted, enter the user name and password created in step 3 of "Creating the initial administrator account."
5. To update the worldwide names of the node's target ports, enter the following command:

   ```
   mod hba -updatetargets
   ```

6. Switch to node 1.
7. Repeat steps 1 through 5 on node 1.

Downloading and installing diagnostic software

There is diagnostic software available for the ProLiant ML370G3 servers, but it is not pre-installed by HP Manufacturing. There are two components of the diagnostic software:

- HP Server Diagnostics
- Diagnostics for Windows

Note: Downloading and installing diagnostic software is not required to complete the appliance setup. You should complete these tasks if you need to troubleshoot issues on the appliance nodes.

HP Server Diagnostics

Use the HP Server Diagnostics software for offline diagnostics. You can verify that a hardware or software component is operating in its nominal range while the appliance operating system and software is *not* running.

To download and install the latest version of HP Server Diagnostics:

1. Go to the HP Support web site at http://welcome.hp.com/country/us/en/support.html.

   The **Support & Drivers** web site opens.
2. Under **Select a task and enter a product name/number**:
   - Select **Download drivers and software**.
   - Enter `ProLiant ML370G3` in the **for** box.
   - Click the double arrow button.

   The **software and drivers** web page (for ProLiant ML370G3) opens.
3. Under **select operating system**, click **Microsoft Windows NT 4.0**.
4. Under **select a category**, click **Software – System Management**.

   Locate the HP Server Diagnostics software.
5. Select the link for the current version of the software.

   The HP Server Diagnostics web page opens and the English version of the download utility is selected automatically. This page also provides details about the contents of the selected software version.
6. Click **download**.
7. Save the download utility (a self-extracting executable) to a directory on the hard drive of your laptop or a customer workstation.

Note: You must use an absolute path, such as `c:\`, when saving the utility. You cannot use a relative path, such as `\\dir`.

8. Execute the utility and follow the instructions provided.
9. When prompted, press the space bar to unpack the files. This creates a new folder within the folder created in step 7 that stores the the diskette image file, image extraction tool, and batch file to create the diskette.

10. After you create the diskette, you can delete the download utility and all folders and files associated with it.
11. Power down the appliance node.
12. Insert the Diagnostics diskette in the `a:\` drive and power on the appliance node.

    The appliance node boots in to the HP Server Diagnostics software.

Diagnostics for Windows

Use the Diagnostics for Windows software for online diagnostics. You can verify that a hardware or software component is operating in its nominal range while the appliance operating system and software is currently running.

To download and install the latest version of Diagnostics for Windows:

1. Go to the HP Support web site at http://welcome.hp.com/country/us/en/support.html.

   The **Support & Drivers** web site opens.
2. Under **Select a task and enter a product name/number**:
   - Select **Download drivers and software**.
   - Enter `ProLiant ML370G3` in the **for** box.
   - Click the double arrow button.

   The **software and drivers** web page (for ProLiant ML370G3) opens.
3. Under **select operating system**, click **Microsoft Windows NT 4.0**.
4. Under **select a category**, click **Software – System Management**.

   Locate the Diagnostics for Windows software.
5. Select the link for the current version of the software.

   The Diagnostics for Windows web page opens and the English version of the download utility is selected automatically. This page also provides details about the contents of the selected software version.
6. Click **download**.
7. Save the download utility (a self-extracting executable) to a directory on the hard drive of the appliance node.
8. Execute the utility and follow the instructions provided.
9. Run `setup.exe` from the directory created in step 7.
10. Click **Next**.
11. Click **Finish**.
12. After installing the software, you can delete the download utility and all folders and files associated with it.

What to do next

To continue with the appliance setup:

1. Configure the hosts and storage arrays that you connect to the appliance. (See "Configuring Hosts and Storage Arrays" on page 53.)
2. Implement path failover, if applicable. (See Implementing Path Failover on page 69.)
3. Complete the wiring between the appliance and the hosts and storage arrays. (See "Connecting the Appliance to Hosts and Storage Arrays" on page 81.)

Configuring Hosts and Storage Arrays

3

This chapter describes how to configure the hosts and storage arrays that you connect to the appliance:

- Host configuration overview, page 54
- Installing HP StorageWorks Auto Path, page 55
- Configuring HBA drivers, page 56
- Using execution throttles, page 58
- Replacing host HBAs, page 62
- Expanding LUNs with the Windows diskpart utility, page 63
- Configuring appliance LUNs for Solaris hosts, page 65
- Configuring storage arrays, page 67
- What to do next, page 68

Host configuration overview

You must configure the hosts connected to the appliance to ensure proper communication. To configure the hosts:

1. Install the HBA driver for the operating system running on the host.
2. Set the execution throttle of the HBA driver for proper load balancing. See "Using execution throttles" on page 58 for more information.

The appliance supports the following HBAs:

- QLogic (for Windows 2000/NT/Server 2003, Linux, Netware, RedHat, and Solaris)
- HP fiber card (for HP-UX)
- Emulex (for Windows 2000/NT/Server 2003, IBM-AIX, RedHat, Solaris)

If the customer purchased HP StorageWorks Auto Path for host-based failover support, you must install this software on each host. See "Installing HP StorageWorks Auto Path" on page 55 for more information.

To optimize appliance performance, HP recommends the following maximum number of host connections:

- 30 dual-HBA hosts with switches
- 6 dual-HBA hosts without switches

The appliance supports these logical unit number (LUN) limits:

- 4,096 virtual LUNs
- 256 LUNs mapped through a node target port per host

Installing HP StorageWorks Auto Path

The Auto Path software is an optional upgrade for the appliance. Install it only if the customer has purchased the Auto Path license.

You install Auto Path using an automated installation program. When the installation is complete and the software is running on the host, users can access Auto Path from any PC connected to the host on which Auto Path is installed.

Windows 2000 and Windows NT

To install Auto Path on a host running Windows 2000 or Windows NT:

1. Log in as the administrator.
2. Insert the HP Auto Path installation CD into the local CD-ROM drive.
3. If Autorun is enabled on the host, the Auto Path installation window opens. Follow the instructions to complete the installation.

   If Autorun is not enabled, click **Start > Run**.
4. Click **Browse** and locate the `setup.exe` file or enter `d:\setup\setup.exe` in the text box. (d:\ is the drive letter of the CD-ROM drive.)
5. Click **OK** to begin the installation.

   The Auto Path installation window opens.
6. Follow the instructions to complete the installation.

Note: Install the Auto Path Remote Access Server software as a command line service or as a Windows service.

Configuring HBA drivers

This section describes the HBA drivers you can configure and the operating systems that support them.

To determine which version of the HBA driver the appliance supports:

1. Access the following internal HP web site:

   http://turbo.rose.hp.com/spock/
2. Locate the **Storage Virtualization** section.
3. Select the appropriate support matrix for the appliance.

QLogic HBAs

The following operating systems support QLogic HBAs:

- Netware 5.1, 6.0, and 6.0 Cluster v1.6
- RedHat Linux 7.1 (Kernel 2.4.2)
- RedHat 8.0 (Kernel 2.4.18)
- RedHat AS 2.1 (Kernel 2.4.9-e.3)
- United Linux 1.0 (Kernel 2.4.19-64GB-SMP 32 bit)
- Suse Linux 8.0 (Kernel 2.4.19-64GB-SMP 32 bit)
- Solaris 2.6, 2.7, 2.8, 2.9, and Veritas Cluster Server v3.5
- Veritas Cluster Server v2.0
- Windows 2000
- Windows 2000 Advanced Server Cluster
- Windows NT 4.0
- Windows NT 4.0 Cluster Server
- Windows Server 2003 32 bit (not clustered)
- Windows Server 2003 64 bit (not clustered)

After you determine which HBA driver to install, go to the QLogic web site (www.qlogic.com) to obtain the appropriate driver and instructions for the desired operating system.

HP fiber card HBAs

The following versions of the HP-UX operating system support the HP fiber card HBAs indicated:

- HP-UX 10.20 (HP A6684A, HP A6685A)
- HP-UX 11.00 (HP A5158A, HP A6684A, HP A6685A)
- HP-UX 11.11 (HP A5158A, HP A6684A, HP A6685A, HP A6795A)

After you determine which HBA driver to install, go to the HP web site (www.hp.com) to obtain the appropriate driver and instructions for the desired operating system.

Emulex HBAs

The following operating systems support Emulex HBAs:

- IBM-AIX 4.3.3
- RedHat 8.0 (Kernel 2.4.18)
- RedHat AS 2.1 (Kernel 2.4.9-e.16)
- Solaris 2.9
- Veritas Cluster Server v2.0
- Windows 2000
- Windows 2000 Advanced Server Cluster
- Windows NT 4.0
- Windows NT 4.0 Cluster Server
- Windows Server 2003 32 bit
- Windows Server 2003 64 bit

After you determine which HBA driver to install, go to the Emulex web site (www.emulex.com) to obtain the appropriate driver and instructions for the desired operating system.

Using execution throttles

This section describes how to calculate the execution throttle for an HBA driver and lists the procedures to set the execution throttle for specific HBA drivers:

- Calculating execution throttles
- Setting the execution throttle for QLogic HBAs
- Setting the execution throttle for Emulex HBAs

Calculating execution throttles

Execution throttles enable you to balance the workload on the appliance. The execution throttle value determines the maximum input/output (I/O) allowed on each node target port. It also determines the maximum number of I/O commands allowed from the host HBA simultaneously.

When HP Manufacturing installs the appliance software, the execution throttle value for the node target ports is set automatically. However, you must set the execution throttle value for each host HBA that is connected to the appliance.

The appliance has the following execution throttle limits:

- The maximum queue depth for each node is 2000.
- The maximum queue depth for each node target port is 480.

Do not exceed either limit when calculating the execution throttle for each host HBA; it can cause the appliance to return `SCSI_QUEUE_FULL` frames to the hosts, resulting in retries or I/O failures on the host. HP strongly recommends that you follow these execution throttle guidelines for all installations.

Examples

If three hosts are directly connected to the appliance, set the execution throttle value to 480 for each host. Because there are three unused target ports on each node, you will not exceed the execution throttle limit.

If five hosts are connected through a switch, they can use any of the node's target ports for I/O. Therefore, you divide 480 by the number of hosts (in this case, 5). Use the result, 96, as the execution throttle value for each host.

Setting the execution throttle for QLogic HBAs

This section describes how to set the execution throttle for QLogic HBA drivers on the following operating systems:

- Windows 2000 and Windows NT
- Solaris

Windows 2000 and Windows NT

To set the execution throttle for a QLogic HBA driver on a Windows 2000 or Windows NT host:

1. Power off and then power on the host.
2. Press **Ctrl+Q** when prompted.

   The **Select Host Adapter** menu opens.
3. Select an adapter and press **Enter**.

   The **Fast!UTIL Options** menu opens (Figure 12).
4. Select **Configuration Settings** and press **Enter**.

   The **Configuration Settings** menu opens.
5. Select **Advanced Adapter Settings** and press **Enter**.

   The **Advanced Adapter Settings** menu opens.
6. Scroll to **Execution Throttle** and press **Enter** to select it.

   The **Enter Decimal Number** dialog box opens.
7. Using the guidelines provided on page 58, enter the appropriate value in the **New** box and press **Enter**.
8. Press **Esc** to return to the **Configuration Settings** menu.
9. Press **Esc** again.

   The **Configuration settings modified** menu opens (Figure 13).
10. Select **Save changes** and press **Enter**.

    The **Fast!UTIL Option** menu opens.
11. To set the execution throttle for other adapters, select **Select Host Adapter** and press **Enter**. Repeat steps 3 through 10 for each adapter.
12. When you finish configuring adapters, select **Exit Fast!UTIL** and press **Enter**.

    The **Exit Fast!UTIL** menu opens (Figure 14).
13. Select **Reboot System** and press **Enter**.

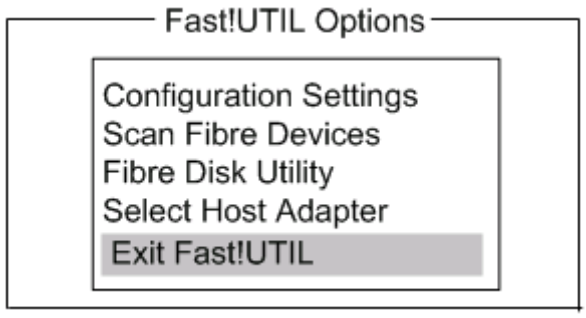


Figure 12: Fast!UTIL Options menu

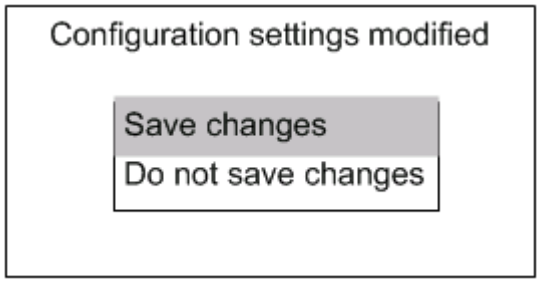


Figure 13: Configuration settings modified menu

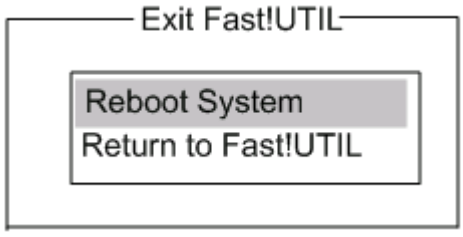


Figure 14: ExitFast!UTIL menu

Solaris

To set the execution throttle for a QLogic HBA driver on a Solaris host:

1. From the host, enter `cd /kernel/drv`.
2. To open the `ql2x00.conf` file, enter:
   `vi ql2x00.conf`
3. Locate the `hba0_execution_throttle =` parameter.
4. Set the parameter to the desired execution throttle value.
5. Save and close the `ql2x00.conf` file.
6. Reboot the host.

Setting the execution throttle for Emulex HBAs

This section describes how to set the execution throttle for Emulex HBAs on the following operating systems:

- Windows 2000 and Windows NT
- IBM-AIX

Windows 2000 and Windows NT

To set the execution throttle for an Emulex HBA on a Windows 2000 or Windows NT host:

1. To open the registry editor, enter:

   `Start RegEdit32.exe`.
2. Go to the directory `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lpxnds\Parameter\Device`.
3. Add values of `QueueDepth` and `QueueTarget`. Use a semicolon (;) to separate multiple entries.
4. Close `RegEdit32.exe` and reboot the host.

IBM-AIX

To set the execution throttle for an Emulex HBA on an IBM-AIX host:

1. At the AIX prompt, enter `smitty lsattr`.
2. When the menu opens, click **List All Defined Devices**.
3. Record the port assigned to the HBA, displayed in the leftmost column.
4. To temporarily disable the device, enter:

   ```
   ifconfig <network configuration> detach
   ```
5. To change the throttle value, enter:

   ```
   chdev -I <port> -a lun_queue_depth=<throttle value>
   ```
6. To enable the device, enter:

   ```
   ifconfig <network configuration> hostname up
   ```

Replacing host HBAs

The following procedure applies to all hosts connected to the appliance.

To replace a host HBA:

1. From the console window, click **sanos admin > launch**.

   The `sanosadmin` window opens.
2. Log in to `sanosadmin`.
3. To identify the host that requires an HBA replacement, enter:

   `get host`
4. To identify the LUNs mapped to the host, enter:

   `get map`
5. Record the LUNs and the node target ports used to map the LUNs to the host.
6. To unmap the LUNs mapped to the host, enter:

   `del map -lun` *`LUN`* `-host` *`HOSTNAME`* `-hostlun` *`HOSTLUN#`* `-hba` *`HBAID`* `-node` *`NODEID`*
7. Repeat step 6 for each LUN mapped to the host.
8. Disconnect the host from the appliance.
9. Replace the host HBA.
10. Connect the host to the appliance.
11. From the host, log in to the appliance's user interface.
12. Click **hosts > view hosts**.

    The **view hosts** window opens.
13. Record the worldwide name of the replaced HBA. (The HBA appears as a host.)
14. Open `sanosadmin` and enter the following command:

    `mod host -hostname` *`HOSTNAME`* `-wwn` *`NEWNODEWWN`*
15. Using the information gathered in step 5, remap each LUN to the host.
16. Perform the procedures that enable the host to detect the LUNs. Refer to your host operating system documentation for more information.
17. Perform a backup of each appliance node.

Expanding LUNs with the Windows diskpart utility

This section describes how to use the Microsoft `diskpart` utility. This utility enables you to expand a LUN that is mapped to a Windows 2000 host without corrupting the data on the LUN. This utility is required for LUNs connected to Windows 2000 hosts because Microsoft does not allow Basic disks (LUNs) to be changed dynamically.

Note: You can expand Dynamic disks that are mapped to a Windows 2000 host without using the diskpart utility. After expanding the disk (LUN) using the appliance's LUN expansion feature, scan the expanded LUN onto the Windows 2000 host. The expanded LUN displays in the Windows Disk Administrator utility.

---

1. Access the following link to download the `diskpart` utility:

   http://support.microsoft.com/default.aspx?scid=kb;en-us;325590&Product=win2000

   Download the utility to the host on which you to expand the LUN.

Note: When you download the utility, the system displays a message recommending that you boot the host in safe mode when you run the diskpart utility. However, it is not necessary to be in safe mode when running the utility.

---

2. After you download the `diskpart` utility, power off the host.
3. Log in to the appliance's user interface.
4. Prepare the LUN(s) that you want to expand. You can expand into multiple LUNs (one at a time), LUN partitions, or other LUN expansions.

   Refer to "Managing LUNs" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for detailed instructions on creating partitions and expansions.

Note: You can create a partition for the LUN you want to expand, using any extra space available. However, you do not have to create a partition if you are using all available space on the LUN.

---

5. Click **LUN resize > create expansion**.

   The **create expansion** window opens.
6. Create a LUN expansion using the LUN that is mapped to the host and the LUN designated for the expansion in step 4.
7. From the **hp OV CASA Console** window, click **sanos admin > launch** and then log in to `sanosadmin`.
8. Enter the following command:

   ```
   mod cache -name all -refresh
   ```

   A series of `Refreshed` messages is displayed. The `mod cache` command synchronizes the user interface with the changes you made in steps 6 and 7.
9. Power up the host.

10. Open Disk Administrator on the host. Verify that the additional disk space appears at the end of the LUN you want to expand.
11. Open the WinZip file that contains the `diskpart` utility. Select the utility and click **Actions > Install** to install the utility on the host.
12. Open a command prompt window on the host.
13. Go to the directory in which you installed the `diskpart` utility. If you used the default directory, go to `c:\program files\resource kit`.
14. Enter the following command:

    ```
    diskpart.exe
    ```

15. At the `diskpart>` prompt, enter:

    ```
    List Volume
    ```

16. To select the LUN you want to expand, enter:

    ```
    select volume #
    ```

Note: You can run the `List Volume` command again to ensure you have selected the correct LUN.

---

17. Enter the following command:

    ```
    Extend
    ```

    The following message is displayed:

    ```
    Diskpart Successfully Extended the Volume
    ```

18. Open Disk Administrator on the host. Verify that the LUN is a Basic disk and reflects the newly expanded size.

Configuring appliance LUNs for Solaris hosts

If the appliance connects to Solaris hosts, you must configure the appliance LUNs to ensure the Solaris hosts can detect the LUNs. The configuration procedures depend on whether or not Veritas Volume Manager (DMP) is installed on hosts.

This section describes the following topics:

- Configuring appliance LUNs without Veritas Volume Manager
- Configuring appliance LUNs with Veritas Volume Manager

For more detailed information about Solaris or Veritas, refer to the appropriate system administrator's guide.

Note: Ensure that the host has the correct HBA driver and configuration file installed. Refer to the appropriate HBA driver installation procedure.

Configuring appliance LUNs without Veritas Volume Manager

To configure appliance LUNs for a Solaris host without Veritas Volume Manager:

1. Connect the Solaris host to the appliance.
2. Use the `-r` option to reboot and reconfigure the Solaris host.
3. Execute `rpicreg` (the appliance host registration utility) on the host. (Refer to "Registering Hosts" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.)
4. Map the appropriate LUNs to the Solaris host from one appliance node only.
5. To enable the mapped LUNs for the Solaris host, do either of the following:
   - Reboot the host.
   - Open a command prompt and enter the following commands:

     ```
     # drvconfig
     # disks
     ```
6. Enter the following command:

   ```
   # format
   ```

   The mapped LUNs are displayed, as shown in the following example:

   ```
   1. c0t0d0 <sun 18G cyl 7506 alt 2 hd 19 sec 248 .....>
   2. c3t2d0 <mapped LUN if host has one hard disk drive only>
   3. c4t1d0 <mapped LUN if host has one hard disk drive only>
   ```
7. Select a LUN. When prompted to label the LUN, enter `yes`.

   The format menu opens.
8. After you label the LUN, select the partition option from the format menu if you want to create a partition of the LUN. Refer to the Solaris administrator's guide for more information about creating partitions.

Configuring appliance LUNs with Veritas Volume Manager

This procedure assumes that Veritas Volume Manager (DMP) is installed and the local hard disk drive has been added to Volume Manager as the root disk.

To configure appliance LUNs for a Solaris host with Veritas Volume Manager:

1. From the Solaris host, go to the `/kernel/drv` directory and use `vi` to edit the `vxdmp.conf` file.
2. Change the parameter `jbod_dmp = "Hitachi" to jbod_dmp= "HP."`
3. Save and exit the `vxdmp.conf` file.
4. Use the –r option to reboot and reconfigure the Solaris host.
5. Map the appropriate LUNs to the Solaris host from both appliance nodes..
6. Follow steps 5 through 7 in "Configuring appliance LUNs without Veritas Volume Manager."
7. Open a command prompt.
8. To ensure the Solaris operating system can use these LUNs, enter the following command:

   `"vxdctl enable"`
9. To verify that you can detect the mapped LUNs in Volume Manager, enter one of the following commands:

   `"vxdisk list"`

   `"vxdiskadm"`
10. Once you can detect the LUNs in Veritas Volume Manager, you should complete the following steps:
    - Add the LUNs to a volume group.
    - Create a logical volume and file system.

    Refer to the Veritas administrator's guide for instructions.

Configuring storage arrays

You must configure the storage arrays before you connect them to the appliance. Refer to the appropriate vendor documentation for the configuration procedures.

To determine which storage arrays the appliance supports:

1. Access the following internal HP web site:

   http://turbo.rose.hp.com/spock/
2. Locate the **Storage Virtualization** section.
3. Select the appropriate support matrix for the appliance.

What to do next

To complete the appliance setup:

1. Implement path failover software, if applicable. (See “Implementing Path Failover” on page 69.)
2. Connect the appliance to the hosts and storage arrays. (See “Connecting the Appliance to Hosts and Storage Arrays” on page 81.)

Implementing Path Failover

4

This chapter describes how to implement path failover for the hosts and storage connected to the appliance:

- Installing HP StorageWorks Secure Path for Windows, page 70
- Installing PowerPath, page 76
- Installing ATF software, page 80
- What to do next, page 80

Installing HP StorageWorks Secure Path for Windows

This section describes how to install and use HP StorageWorks Secure Path:

- Secure Path overview
- Installing the Secure Path Agent
- Installing Secure Path Manager
- Configuring Secure Path Manager
- Using Secure Path Manager

Secure Path overview

The appliance installation CD contains the Secure Path for Windows failover software and license agreement, which states that Secure Path is licensed for use with the appliance only.

Secure Path provides node failover when the appliance is connected to any of the following arrays:

- HP StorageWorks Modular SAN Arrays (MSA)
- HP StorageWorks EMA/MA (HSG80 controllers)
- HP StorageWorks Enterprise Virtual Arrays (EVAs) with HSV controllers

The Secure Path software contains the Agent, which is already installed on the appliance nodes, and the Manager, which you install on the hosts.

For more information about Secure Path V4.0B, refer to the *HP StorageWorks Secure Path V4.0B for Windows Workgroup Edition Read Me First* (June 2003, part number AA-RR4BD-TE) at the following web site:

http://h18000.www1.hp.com/products/sanworks/secure-path/documentation.html

Click **manuals (guides, supplements, addendums, etc.)** under self-help resources. Scroll through the list of manuals and click **secure path v4.0B for Windows workgroup edition read me first**.

Installing the Secure Path Agent

The Secure Path Agent is installed on the appliance nodes when the appliance software is installed.

To configure Secure Path Agent on the appliance node:

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui**.

   The **CASA UI Switch Utility** dialog box opens.
3. Click **Yes** to continue.

   The Windows NT desktop opens.
4. Click **Start > Programs > Securepath >SecurePathCfg**.

   The **Secure Path Configuration** window opens.
5. Click **Clients**.

   The **Clients** dialog box opens.
6. If the name `casapeernode` is listed, select the name and click **Delete Client**.
7. Enter the appliance node name (for example, `CasaN_0`) in the **Selected Client** box.
8. Click **Add Client**.
9. Enter the name of the host on which Secure Path Manager is (or will be) installed in the **Selected Client** box.
10. Click **Add Client**.

    The names of the appliance node and the host display under **Clients**.
11. Click **OK**.
12. Click **Password**.
13. Enter the password twice. The password length must be between eight and sixteen characters.
14. Click **OK**.
15. Click **Done**.
16. Repeat step 1 through step 15 on the other appliance node.

Installing Secure Path Manager

Ensure the host meets the following requirements before installing Secure Path Manager:

- Internet Explorer
- IP connectivity to the appliance node
- JAVA version 1.3.1 *only*
- Supported Secure Path Manager version (confirm with CASA support team)

To install Secure Path Manager on a host:

1. Copy the following executable to the host on which you want to install Secure Path Manager:

   `SPM_V40_xx.exe`

   This executable is also located on the appliance nodes in the following directory:
   `c:\sanlink support software\compaq storage\SecurePath\v4.0xx`
2. From the host, use WinZip to extract the contents of the `SPM_V40_xx.exe` file to a temporary directory, such as `c:\sp`.
3. Open the `c:\sp\SPM_V40_xx` directory and run `AutoMenu.exe`.
4. Click **Install Applications**.
5. Click **Install SecurePath Manager**.
6. Click **Next**.
7. Click **Yes** for the license agreement.
8. Click **Next** when prompted for the directory location.
9. At the `Install Notification Utility?` prompt, click **No**.
10. At the confirmation prompt, click **No**.
11. Click **Next**.
12. Click **Finish**.
13. Click **Exit** twice.

Configuring Secure Path Manager

To configure Secure Path Manager on the host:

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui**.

   The **CASA UI Switch Utility** dialog box opens.
3. Click **Yes** to continue.

   The Windows NT desktop opens.
4. Click **Start > Programs > Securepath >SecurePathCfg**.

   The **Secure Path Configuration Utility** window opens (Figure 15).
5. Click **Clients**.

   The **Client Access Configuration** window opens (Figure 16).
6. If `casapeernode` is listed in the **Clients** box, select the name and click **Delete Client**.
7. Enter the appliance node name (for example, `CasaN_0`) in the **Selected Client** box.
8. Click **Add Client**.
9. Enter the other appliance node name (for example, `CasaN_1`) in the **Selected Client** box.
10. Click **Add Client**.

    The names of both appliance nodes and the host display under **Clients**.
11. Click **OK**.
12. Click **Password**.
13. Enter the password twice. Use the password entered in step 13 of "Installing the Secure Path Agent" on page 71.
14. Click **OK**.
15. Click **Done**.
16. Repeat step 1 through step 15 on the other appliance node.

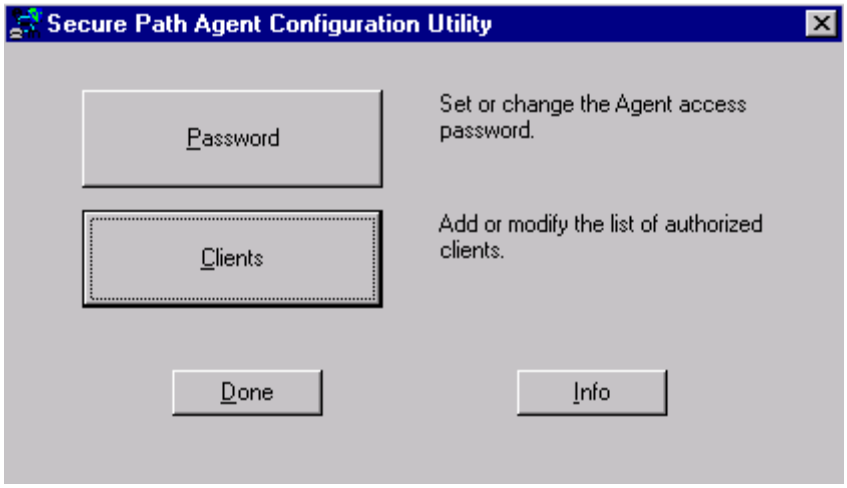


Figure 15: Secure Path Agent Configuration Utility window

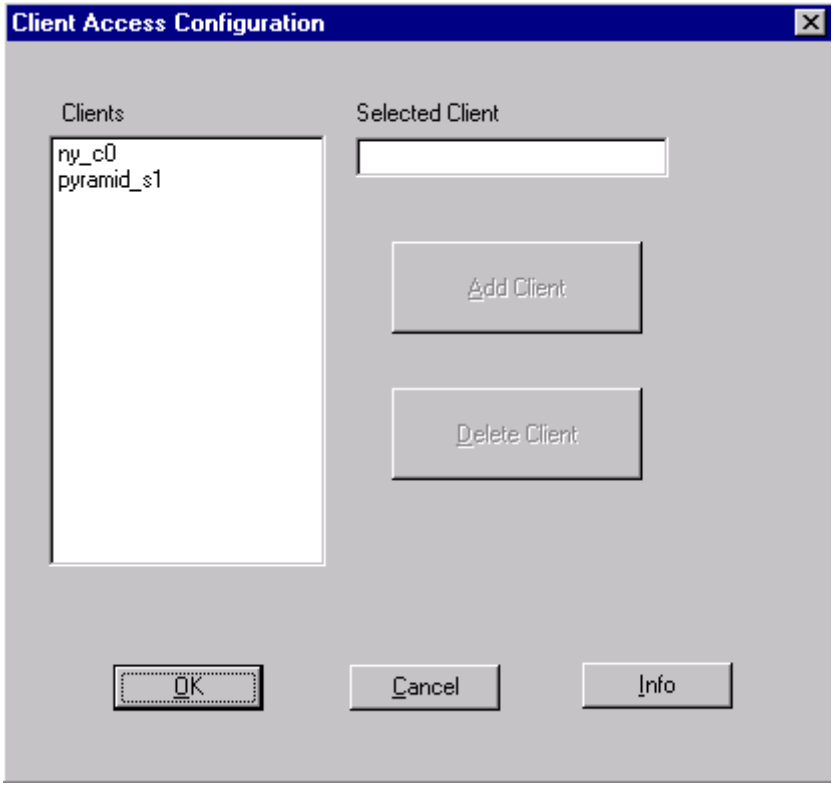


Figure 16: Client Access Configuration window

Using Secure Path Manager

To use Secure Path Manager on a host:

1. Open Internet Explorer.
2. Enter the URL in the **Address** box using the following format:

   `http:// xxx.xxx.xxx.xxx:2301`
   (`xxx.xxx.xxx.xxx` is the IP address of the host on which Secure Path Manager is installed.)
3. Log in using the following information:
   - User name—`administrator`
   - Password—`administrator`
4. Once Secure Path Manager is running, click **File > New Profile**.
5. Enter a name for the profile and click **OK**.
6. When prompted for a new password, enter the password you specified in step 3.
7. When prompted for a host name, enter the name of node 0.
8. Repeat step 7 and enter the name of node 1.
9. Click **Done**.

   Secure Path Manager is connected to the Secure Path Agent running on the appliance nodes.

Installing PowerPath

This section describes how to install PowerPath version 3.0.5 on the appliance nodes. Use this software if there are EMC storage arrays connected to the appliance.

This section describes the following topics:

- Downloading the 3.0.5 patch
- Installing version 3.0.0
- Installing version 3.0.5

Note: If Secure Path is already installed on the appliance nodes, do *not* install PowerPath. Installing both PowerPath and Secure Path on the appliance nodes is not supported.

Prerequisites:

- Current SANOS version is 5.6.1.17.
- The EMC PowerPath version 3.0.5 CD for Windows, which includes PowerPath version 3.0.0 for Windows NT4. (The customer should have received this CD when the EMC storage array was purchased.)

Note: A Power Path 3.0.5 installation CD for Windows NT is not available. You must use the 3.0.5 CD for Windows to install PowerPath 3.0.0 first. Then you can upgrade to version 3.0.5 using the patch that you download from the EMC web site (See "Downloading the 3.0.5 patch.")

Downloading the 3.0.5 patch

Instruct the customer to log on to EMC's web site, using the appropriate account information, and download the 3.0.5 patch.

The name of the patch is `EMCPP.NT4.3.0.5.Patchb086.zip`. Extract the contents of the zip file to the `c:\EMCPP.NT4.3.0.5.Patchb086` folder.

Installing version 3.0.0

Note: Ensure that you stop the RPIC DPF and SMS services before installing PowerPath.

To install PowerPath version 3.0.0 on node 0:

1. Insert the EMC PowerPath version 3.0.5 for windows CD into the CD-ROM drive.
2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Click **service viewer**.

   The **Services** window opens.
4. Select the **RPIC DPF** service, set it to **Manual**, and click **Apply**.
5. If the status of the service is **Active**, click **Stop**.
6. Repeat steps 4 and 5 for the **SMS** service.
7. Close the **Services** window.
8. Press **Alt+C** to open a command prompt window.
9. To access the CD-ROM drive, enter:

   `d:`
10. To execute the `EMCPP.NT4.3.0.0.GA.exe` file, enter:

    `d:\nt4\ EMCPP.NT4.3.0.0.GA.exe`

    The **EMC PowerPath 3.0.0. – Install Shield Wizard Welcome** window opens.
11. Click **Next**.
12. Enter the customer's name and organization and click **Next**.
13. Click **Next** to install the software on the default directory listed.

Note: HP recommends that you use the default directory.

    The **Ready to Begin Installation** dialog box opens.
14. Click **Install**.
15. When prompted, enter the 24-digit registration number in the **License Key** box.
16. Click **Add**, and then click **OK**.

    The **EMC PowerPath 3.0.0. – Install Shield Wizard Completed** window opens.
17. Click **Finish**.
18. When prompted to reboot the host, click **Yes**.

    The appliance node is rebooted.

The installation of PowerPath 3.0.0 is complete. Continue with "Installing version 3.0.5."

Installing version 3.0.5

To install PowerPath version 3.0.5 on node 0:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Press **Alt+C** to open a command prompt window.
3. To execute the 3.0.5 patch, enter:

   `c:\EMCPP.NT4.3.0.5.Patchb086\setup.exe`

   The **EMC PowerPath 3.0.5. – Install Shield Wizard Welcome** window opens.
4. Click **Next**.
5. Enter the customer's name and organization and click **Next**.
6. Click **Next** to install the software on the default directory listed. HP recommends that you use the default directory.

   The **Ready to Begin Installation** dialog box opens.
7. Click **Install**.
8. When the **EMC PowerPath 3.0.0. – Install Shield Wizard Completed** window opens, click **Finish**.
9. When prompted to reboot the host, click **Yes**.

   The appliance node is rebooted.
10. Ensure that the **hp OV CASA Console** window is open in administrative mode.
11. Click **service viewer**.

    The **Services** window opens.
12. Select the **RPIC DPF** service, set it to **Automatic**, and click **Apply**.
13. Click **Start**.
14. Repeat steps 12 and 13 for the SMS service.
15. Close the **Services** window.
16. If this was an online installation, verify that the hosts connected to the EMC storage arrays can detect both paths. Otherwise, go to step 17.
17. Switch the console display to node 1 and complete the following steps:
    - Download the patch as instructed in "Downloading the 3.0.5 patch."
    - Complete step 1 through step 18 from "Installing version 3.0.0."
    - Complete step 1 through step 16 from "Installing version 3.0.5."
18. If you have not attached the EMC storage arrays to the appliance, go to step 19. If the arrays are connected, go to step 20.
19. Connect the EMC storage arrays to the appliance.
20. If you have not already initialized `sanosadmin`, then initialize it on both appliance nodes. (See "Initializing the user database" on page 48.)
21. From the console window of either appliance node, click **sanos admin > launch**.

    The **sanosadmin** window opens.
22. Log in to `sanosadmin`.

23. To update the appliance configuration with the EMC LUNs, enter:

    ```
    mod lun -rescan
    ```

24. To verify that the appliance can detect the EMC LUNs:
    - In `sanosdamin`, enter `get lun`.
    - In the user interface, click **LUNs** to open the **view LUNs** window.
25. Close `sanosadmin` and the user interface.
26. Ensure that the console window is open in administrative mode.
27. To open PowerPath Administrator, right-click on the console window and select **Program Files > EMC > PowerPath > PowerPath Administrator**.
28. Verify that the EMC LUNs are present.

Installing ATF software

Note: This procedure only applies if the customer uses EMC CLARiiON storage, which requires that you install the Application Transparent Failover (ATF) software on the appliance nodes.

The ATF installer will fail if you execute it from the the **hp OV CASA Console** window. If that occurs, perform the following steps:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui**.
3. When the **CASA Switch UI Utility** dialog box opens, click **Yes**.

   The Windows NT desktop opens.
4. Refer to your ATF documentation to install ATF.
5. When prompted, reboot the appliance node.
6. Ensure that the **hp OV CASA Console** window is open in administrative mode.
7. Click **backup\restore > backup** to perform a backup on the appliance node.

What to do next

To complete the appliance setup, connect the appliance to the hosts and storage arrays. (See "Connecting the Appliance to Hosts and Storage Arrays" on page 81.)

Connecting the Appliance to Hosts and Storage Arrays

5

Connecting the appliance to hosts and storage depends on the customer's network configuration. This chapter describes how to connect the appliance in three standard configurations. It also provides a sample cascaded appliance configuration for cross-appliance mirroring.

This chapter describes the following topics:

- Directly connecting hosts and storage to the appliance, page 82
- Connecting hosts and storage arrays through switches, page 84
- Connecting hosts and EVAs through switches, page 86
- Connecting two appliances through a WAN, page 87
- Connecting cascaded appliances, page 88
- Creating zones for the switches, page 94

Directly connecting hosts and storage to the appliance

Figure 17 shows three hosts and two storage arrays directly connected to the appliance. In this example, assume the following:

- I0 from each peer node connects to the shared storage array.
- From host 1, HBA 1 connects to T0 on peer node 0, and HBA 2 connects to T0 on peer node 1.
- From host 2, HBA 1 connects to T2 on peer node 0, and HBA 2 connects to T2 on peer node 1.
- From host 3, HBA 1 connects to T1 on peer node 0, and HBA2 connects to T1 on peer node 1.
- From storage array 1, controller 0 connects to I1 on peer node 0, and controller 1 connects to I1 on peer node 1.
- From storage array 2, controller 0 connects to I2 on peer node 0, and controller 1 connects to I2 on peer node 1.
- The LAN interface and Gigabit Ethernet connections exist but are not shown.

Note: When connecting hosts and storage arrays directly to the appliance, ensure that the topology for the target ports is set to Loop. When using switches, set the topology to Point to Point. Refer to "Configuring Target Ports" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.

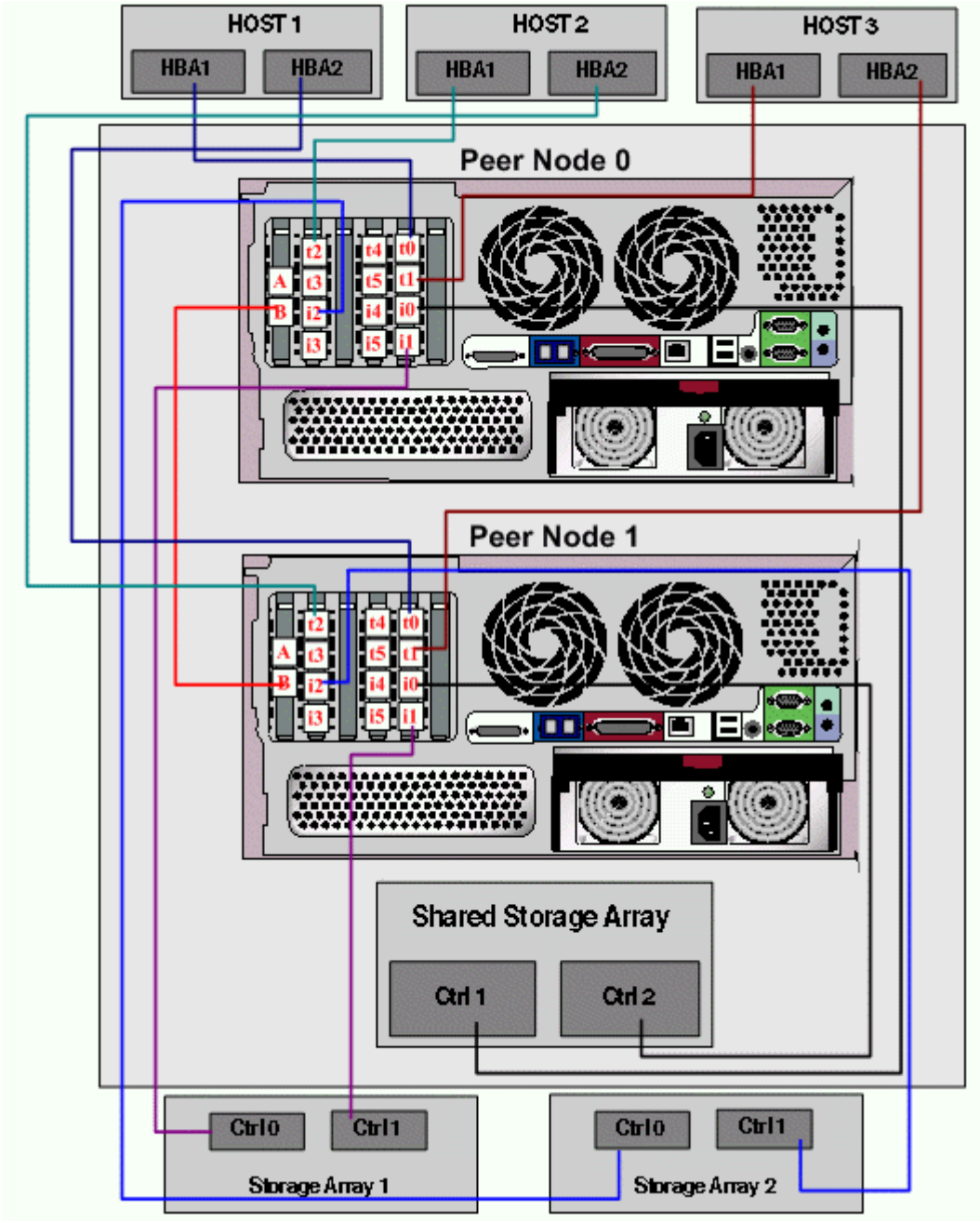


Figure 17: Hosts and storage directly connected to the appliance

Connecting hosts and storage arrays through switches

Figure 18 shows two hosts and two storage arrays connected to the appliance through Fibre Channel switches. Adding switches as a layer between the appliance and the hosts and storage arrays enables you to connect more hosts and storage arrays to the appliance.

In this example, assume the following:

- Two Fibre Channel switches on the front end connect the two peer nodes to two hosts.
- Two Fibre Channel switches on the back end connect the two peer nodes to two storage arrays, enabling back-end failover.
- Six target ports (T0, T1, T2, T3, T4, and T5) on peer node 0 connect to FC switch 1 (front end).
- Six target ports (T0, T1, T2, T3, T4, and T5) on peer node 1 connect to FC switch 2 (front end).
- I1 on peer node 0 connects to port 0 on back-end FC switch 1.
- I1 on peer node 1 connects to port 0 on back-end FC switch 2.
- I2 on peer node 0 connects to port 1 on back-end FC switch 2.
- I2 on peer node 1 connects to port 1 on back-end FC switch 1.
- Zone the switches as follows:
  - Zone each host initiator separately with each target port on each front-end switch. For example:
    - Zone 1 contains port 0 and port 6.
    - Zone 2 contains port 1 and port 6.
    - Zone 3 contains port 2 and port 6.
    - Zone 4 contains port 3 and port 6.
    - Zone 5 contains port 4 and port 6.
    - Zone 6 contains port 5 and port 6.
  - Zone each storage initiator separately with each storage HBA port. For example:
    - Zone 1 contains port 0 and port 2.
    - Zone 2 contains port 0 and port 3.
    - Zone 3 contains port 1 and port 2.
    - Zone 4 contains port 1 and port 3.

  HP recommends that you zone the host and storage HBA ports separately with the appropriate appliance target and initiator ports. Zoning individual ports ensures that one port does not cause problems with other ports. Zoning standards facilitate support of the customer's zoning configurations.
- The LAN interface and Gigabit Ethernet connections exist but are not not shown.

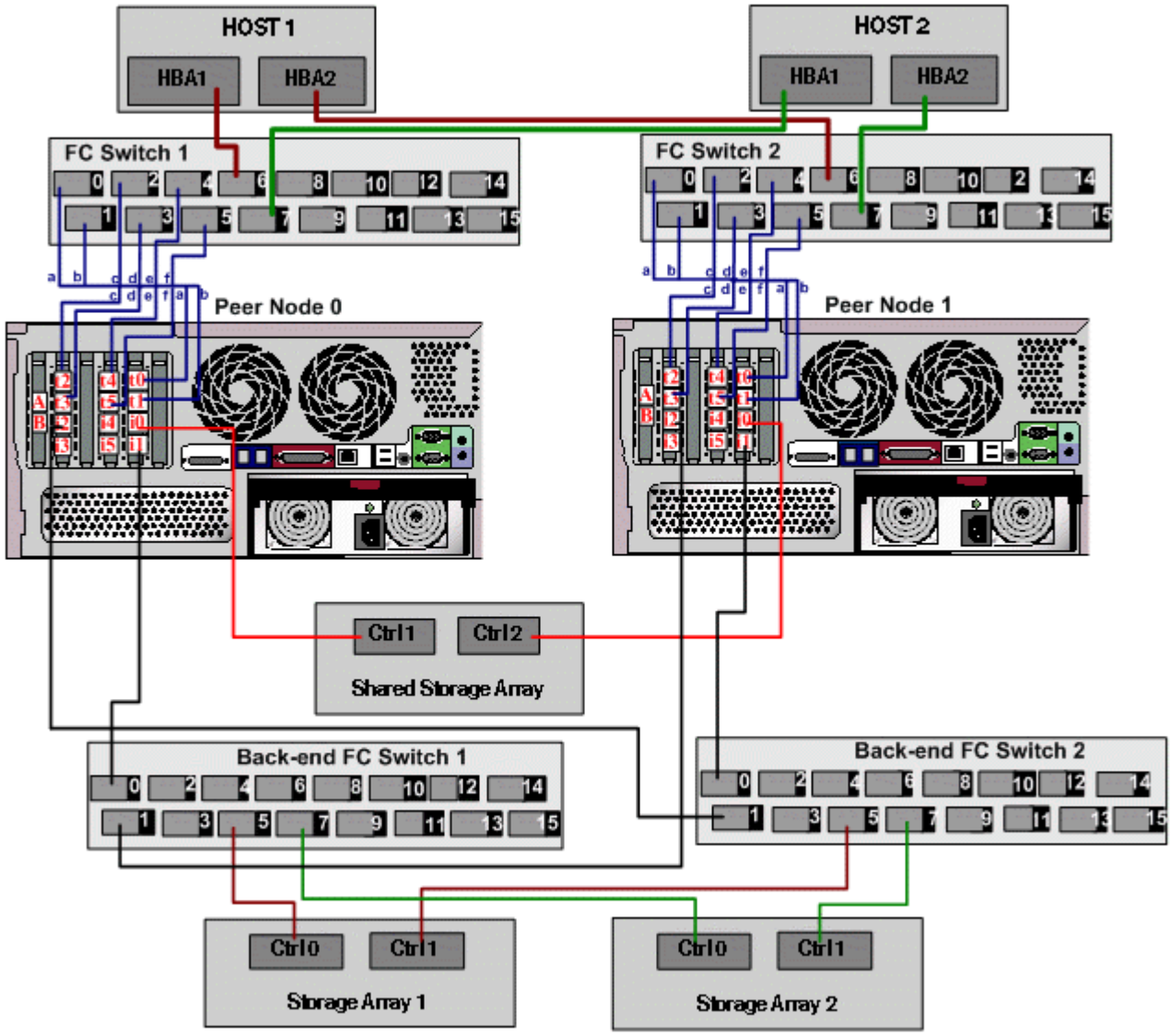


Figure 18: Hosts and storage arrays connected through Fibre Channel switches

Connecting hosts and EVAs through switches

Figure 19 shows two hosts and two HP StorageWorks Enterprise Virtual Arrays (EVAs) connected to the appliance through Fibre Channel switches.

The controllers on each array in Figure 18 have one port. Each controller on the EVA has two ports. As a result, the EVAs require an additional connection to the back-end switches. One port on each controller connects to back-end FC switch 1, and the second port on each controller connects to back-end FC switch 2.

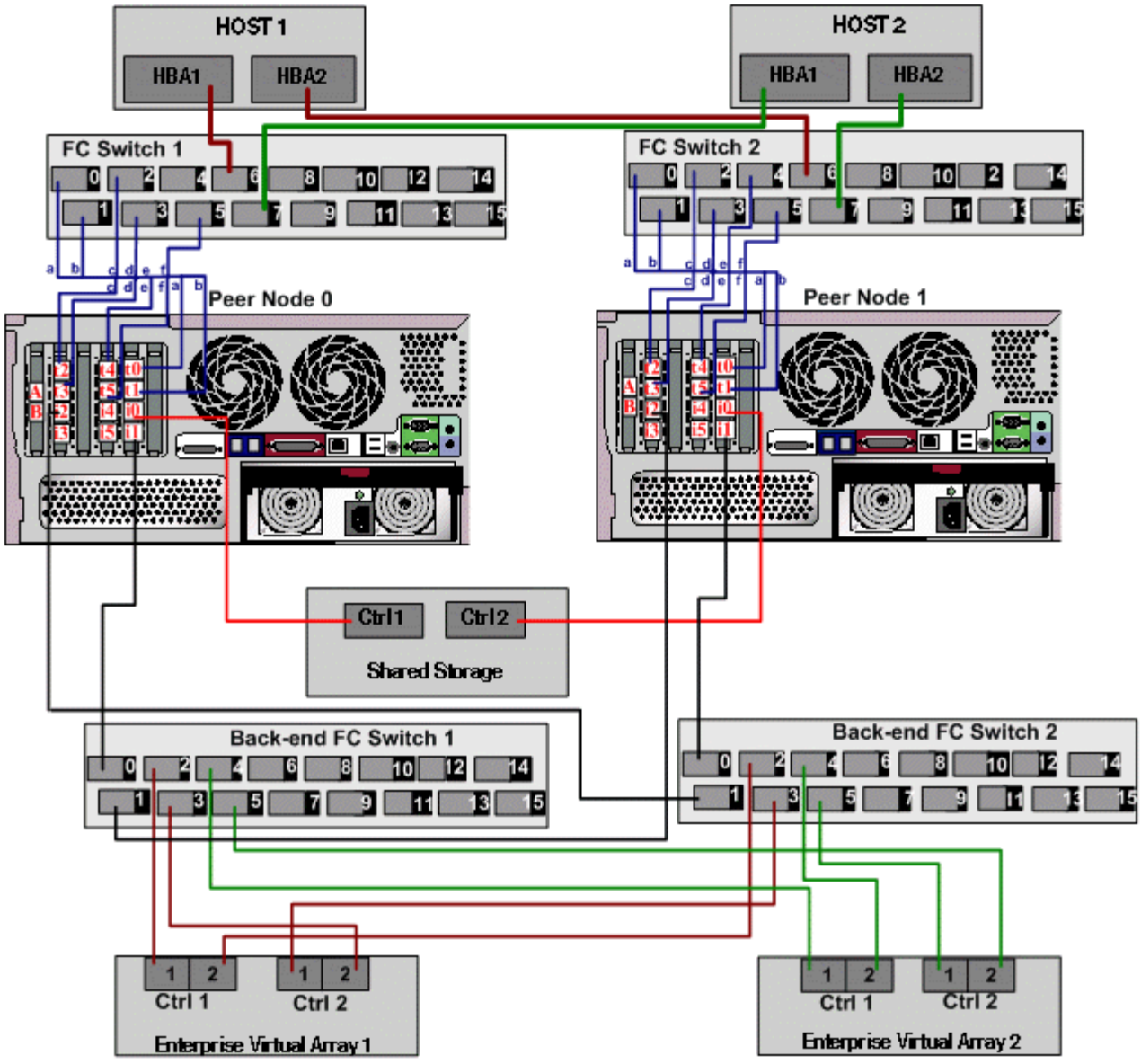


Figure 19: Hosts and EVAs connected through Fibre Channel switches

Connecting two appliances through a WAN

Figure 20 shows two appliances connected through a wide area network (WAN). This configuration includes the optional IP mirroring functionality.

In this example, assume the following:

- Each peer node on the local and remote appliances connects to a Gigabit Ethernet router (or switch), that connects to the WAN.
- The host and storage array connections described on page 84 also apply to this example.

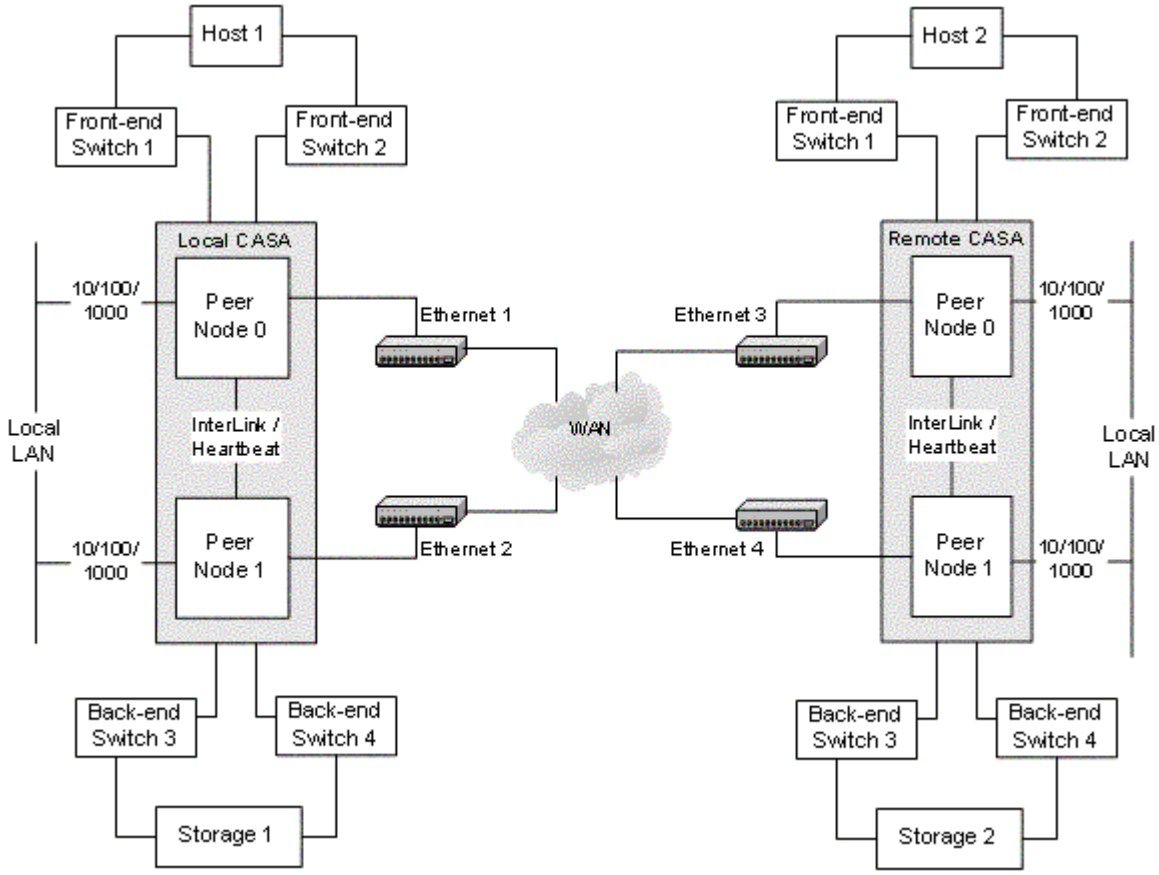


Figure 20: Two appliances connected through a WAN

Connecting cascaded appliances

You can directly connect or interconnect (using zoned Fibre Channel switches) two appliances and create a cascaded configuration. A cascaded configuration enables cross-appliance mirroring, which means you can mirror data from storage on one appliance to storage on another appliance through a Fibre Channel cable.

After you complete the appropriate connections, refer to "Managing Cross-Appliance Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for instructions on creating cross-appliance mirrors.

Whether you are using switches and fabrics or directly connecting the appliances to create a cascaded configuration, HP recommends that you dedicate an initiator port (I5) and target port (T5) on each appliance node to make these connections.

If you move an existing appliance configuration to a cascaded environment, you must rezone and reconnect all hardware to accommodate the dedicated initiator port and target port.

Directly connecting cascaded appliances

Figure 21 shows two appliances directly connected to create a cascaded configuration.

In this example, assume the following:

- I0 on each peer node connects to the shared storage.
- Port B on node 0 connects to port B on node 1 of appliance A, and port B on node 0 connects to port B on node 1 of appliance B.
- T5 on node 0 of appliance A connects to I5 on node 0 of appliance B.
- T5 on node 0 of appliance B connects to I5 on node 0 of appliance A.
- T5 on node 1 of appliance A connects to I5 on node 1 of appliance B.
- T5 on node 1 of appliance B connects to I5 on node 1 of appliance A.

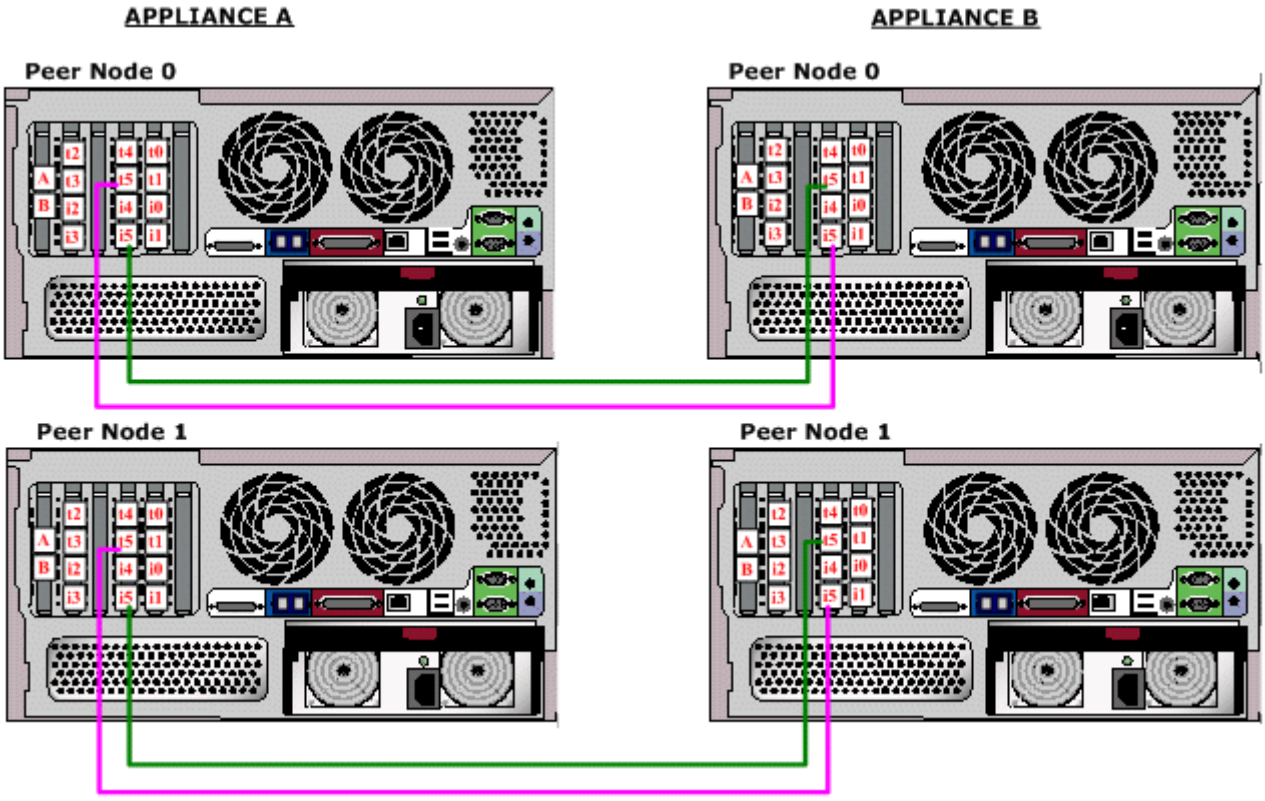


Figure 21: Two directly connected cascaded appliances

Connecting cascaded appliances through switches and fabrics

Figure 22 shows two cascaded appliances connected through switches and fabrics. In this example, assume the following:

- CASA A on site A has peer nodes 0 and 1 (CAP0, CAP1). Five targets (T0, T1, T2, T3, and T4) and two initiators (I1 and I4) from each node connect to the Fibre Channel switches as described on page 91.
- CASA B on site B has peer nodes 0 and 1 (CBP0, CBP1). Five targets (T0, T1, T2, T3, and T4) and two initiators (I1 and I4) from each node connect to the Fibre Channel switches as described on page 92.
- T5 and I5 on each node create the cascaded configuration between CASA A and CASA B.
- Host 1 (with HBA 1 and 2) connects to site A (H1_1, H1_2).
- Host 2 (with HBA 1 and 2) connects to site B (H2_1, H2_2).
- Storage 1 connects to site A. The array has two dual–port controllers. Controller A has ports 1 and 2 (S1A1, S1A2), and controller B has ports 1 and 2 (S1B1, S1B2).
- Storage 2 connects to Site B. The array has two dual–port controllers. Controller A has ports 1and 2 (S2A1, S2A2), and controller B has ports 1 and 2 (S2B1, S2B2).
- CASA A connects to four switches. CASW1 and CASW3 connect the appliance node targets to host 1. CASW2 and CASW4 connect the appliance node initiators to storage 1.
- CASA B connects to four switches. CBSW1 and CBSW3 connect the appliance node targets to host 2. CBSW2 and CBSW4 connect the appliance node initiators to storage 2.

Creating a cascaded environment requires the following:

- Two fabrics on each site, for a total of four fabrics. Site A has Fabric A (CAM_A) and Fabric B (CAM_B). Site B has Fabric C (CAM_C) and Fabric D (CAM_D).
- An extended fabric (called an E port) that connects the two sites. For example, you can designate port 15 on each switch as the E port.

  You create the extended fabric by connecting a switch from each site, enabling the appliance to share configuration data. The fabrics have the following connections:

  — CAM_A connects CASW1 (Site A) to CBSW2 (Site B).

  — CAM_B connects CASW2 (Site A) to CBSW1 (Site B).

  — CAM_C connects CASW3 (Site A) to CBSW4 (Site B).

  — CAM_D connects CASW4 (Site A) to CBSW3 (Site B).
- Ten zones for each fabric.
- Two ports for each zone.

Creating the fabric zones for CASA A

This section describes the fabric zones and port connections for CASA A.

Fabric **CAM_A** has **CASW1** and **CBSW2** and the following zones:

- Zone 1: port connections for H1_1 and CAP0T0
- Zone 2: port connections for H1_1 and CAP0T1
- Zone 3: port connections for H1_1 and CAP0T2
- Zone 4: port connections for H1_1 and CAP0T3
- Zone 5: port connections for H1_1 and CAP0T4
- Zone 6: port connections for S2A1 and CBP0I1
- Zone 7: port connections for S2B2 and CBP0I1
- Zone 8: port connections for S2A1 and CBP1I4
- Zone 9: port connections for S2B2 and CBP1I4
- Zone 10: port connections between sites using CAP0T5 and CBP0I5

Fabric **CAM_B** has **CASW2** and **CBSW1** and the following zones:

- Zone 1: port connections for H2_1 and CBP0T0
- Zone 2: port connections for H2_1 and CBP0T1
- Zone 3: port connections for H2_1 and CBP0T2
- Zone 4: port connections for H2_1 and CBP0T3
- Zone 5: port connections for H2_1 and CBP0T4
- Zone 6: port connections for S1A1 and CAP0I1
- Zone 7: port connections for S1B2 and CAP0I1
- Zone 8: port connections for S1A1 and CAP1I4
- Zone 9: port connections for S1B2 and CAP1I4
- Zone 10: port connections between sites using CAP0I5 and CBP0T5

Creating the fabric zones for CASA B

This section describes the fabric zones and port connections for CASA B.

Fabric **CAM_C** has **CASW3** and **CBSW4** and the following zones:

- Zone 1: port connections for H1_2 and CAP1T0
- Zone 2: port connections for H1_2 and CAP1T1
- Zone 3: port connections for H1_2 and CAP1T2
- Zone 4: port connections for H1_2 and CAP1T3
- Zone 5: port connections for H1_2 and CAP1T4
- Zone 6: port connections for S2A2 and CBP1I1
- Zone 7: port connections for S2B1 and CBP1I1
- Zone 8: port connections for S2A2 and CBP0I4
- Zone 9: port connections for S2B1 and CBP0I4
- Zone 10: port connections between sites using CAP1T5 and CBP1I5

Fabric **CAM_D** has **CASW4** and **CBSW3** and the following zones:

- Zone 1: port connections for H2_2 and CBP1T0
- Zone 2: port connections for H2_2 and CBP1T1
- Zone 3: port connections for H2_2 and CBP1T2
- Zone 4: port connections for H2_2 and CBP1T3
- Zone 5: port connections for H2_2 and CBP1T4
- Zone 6: port connections for S1B1 and CAP1I1
- Zone 7: port connections for S1A2 and CAP1I1
- Zone 8: port connections for S1B1 and CAP0I4
- Zone 9: port connections for S1A2 and CAP0I4
- Zone 10: port connections between sites using CAP1I5 and CBP1T5

Figure 22 shows two cascaded appliance connected through fabrics and switches.

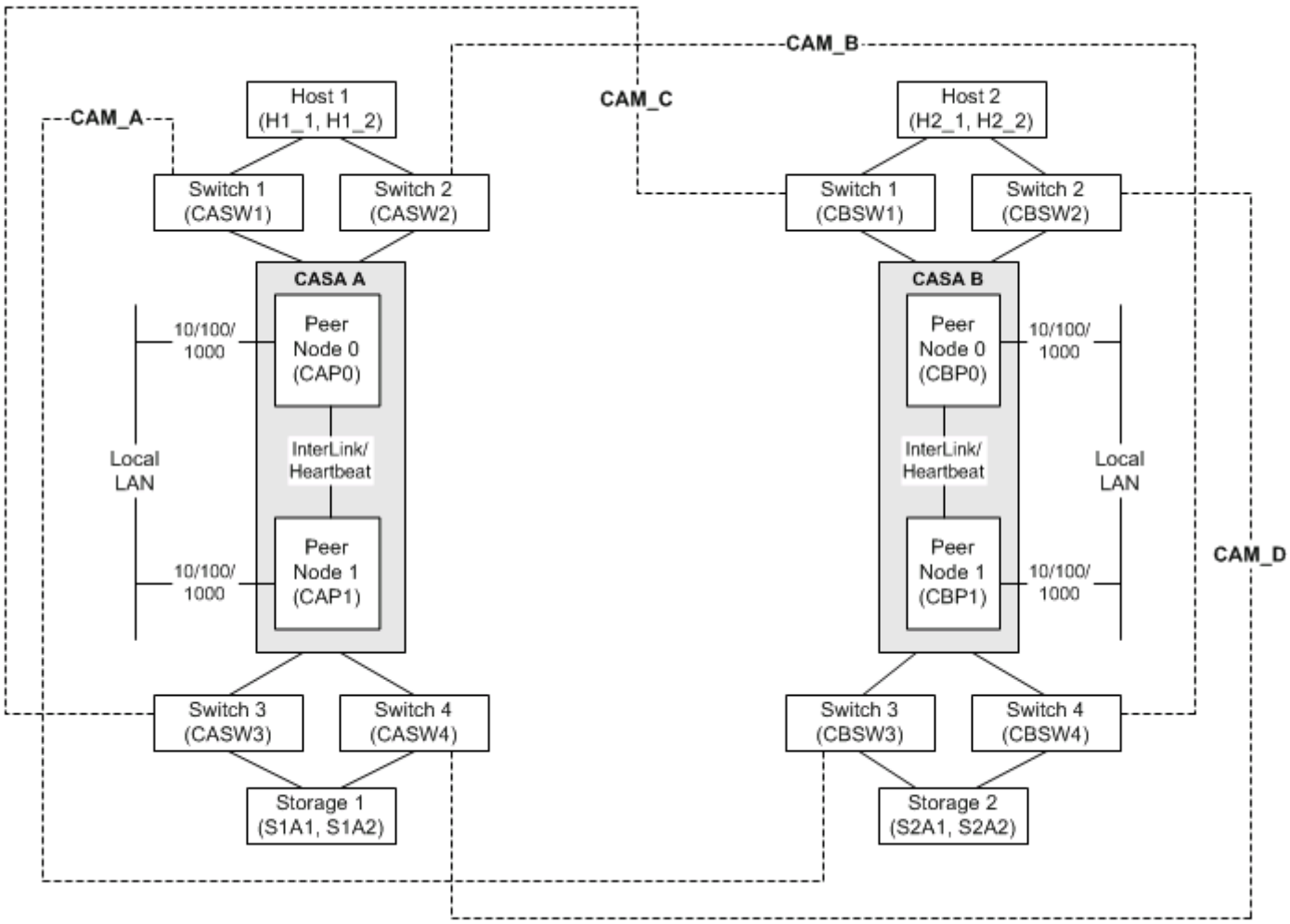


Figure 22: Two cascaded appliances connected through fabrics and switches

Creating zones for the switches

This section describes a configuration in which two switches connect to the front end of the appliance and two switches connect to the back end of the appliance, enabling failover and recovery (See Figure 18 and Figure 19.) This configuration allows multiple host connections on the front end and multiple storage connections on the back end.

This section describes the following topics:

- Zones for front-end switches
- Zones for back-end switches

Zones for front-end switches

Create zones that have one host initiator and one appliance target. The six appliance targets connect to the first six ports on the switch (0–5). For each host initiator connected to the switch (ports 6 and 7 on the switch), create six zones—one for each appliance target (Figure 23 and Figure 24).

Table 6 lists the zones you create for two hosts connected to the switch (a total of 12 zones). The appliance target use six ports on the switch; you can use the remaining 10 ports for host connections. You can connect a maximum of 10 hosts to a non–cascaded 16–port switch, creating 60 host zones (six targets multiplied by 10 hosts).

Table 6: Host zones for front–end switches

Host zone	Switch ports															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	X						X									
2		X					X									
3			X				X									
4				X			X									
5					X		X									
6						X	X									
7	X							X								
8		X						X								
9			X					X								
10				X				X								
11					X			X								
12						X		X								

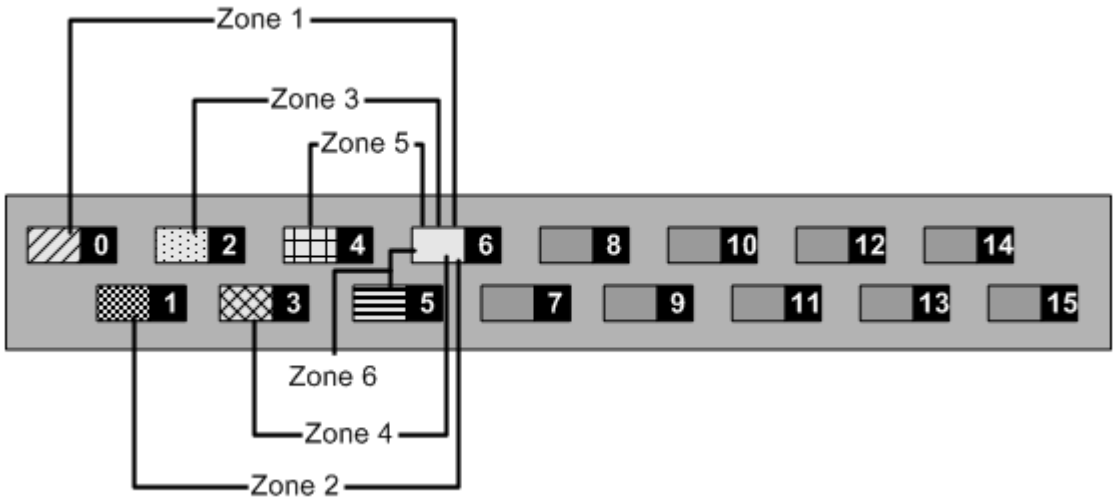


Figure 23: Six zones for the first host initiator

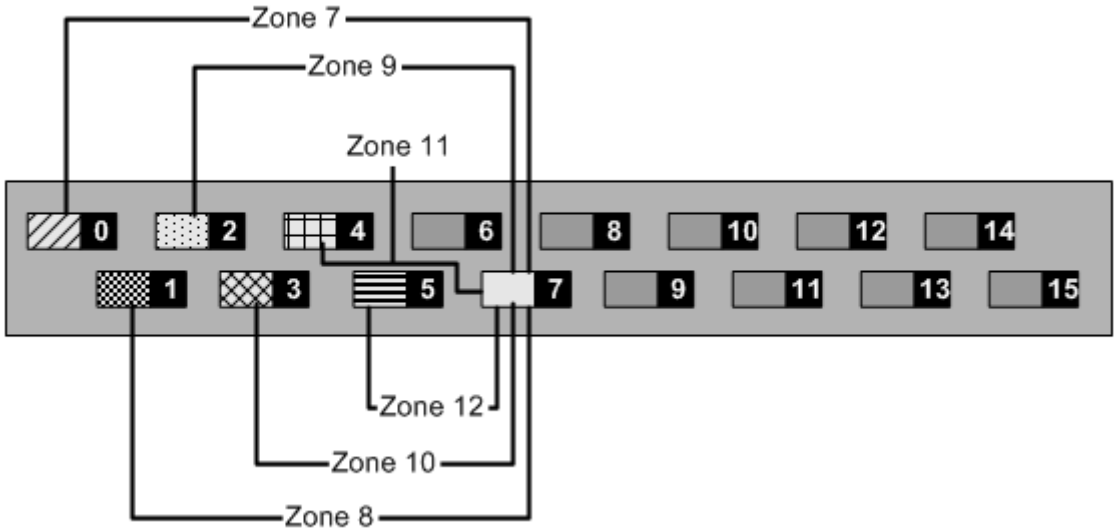


Figure 24: Six zones for the second host initiator

Zones for back-end switches

Create zones that have one appliance initiator and one storage controller port. Storage arrays may have one port per controller (Figure 18) or two ports per controller (Figure 19). The two appliance initiators connect to the switches as follows:

- From node 0:
  - I1 connects to port 0 on back-end switch 1.
  - I2 connects to port 1 on back-end switch 2.
- From node 1:
  - I1 connects to port 0 on back-end switch 2.
  - I2 connects to port 1 on back-end switch 1.

Table 7 lists the zones you create for two storage arrays (with one port per controller) connected to the switch (a total of 28 storage zones). For each storage controller port connected to the switch, create four zones—one for each appliance initiator (Figure 25). You can connect a maximum of 14 storage arrays to a non–cascaded 16–port switch (two initiators multiplied by 14 storage arrays).

Table 7: Storage zones for back–end switches

Storage zone	Switch ports															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	X		X													
2		X	X													
3	X			X												
4		X		X												
5	X				X											
6		X			X											
7	X					X										
8		X				X										
9	X						X									
10		X					X									
11	X							X								
12		X						X								
13	X								X							
14		X							X							
15	X									X						
16		X								X						
17	X										X					
18		X									X					
19	X											X				
20		X										X				

Table 7: Storage zones for back–end switches

Storage zone	Switch ports															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
21	X												X			
22		X											X			
23	X													X		
24		X												X		
25	X														X	
26		X													X	
27	X															X
28		X														X

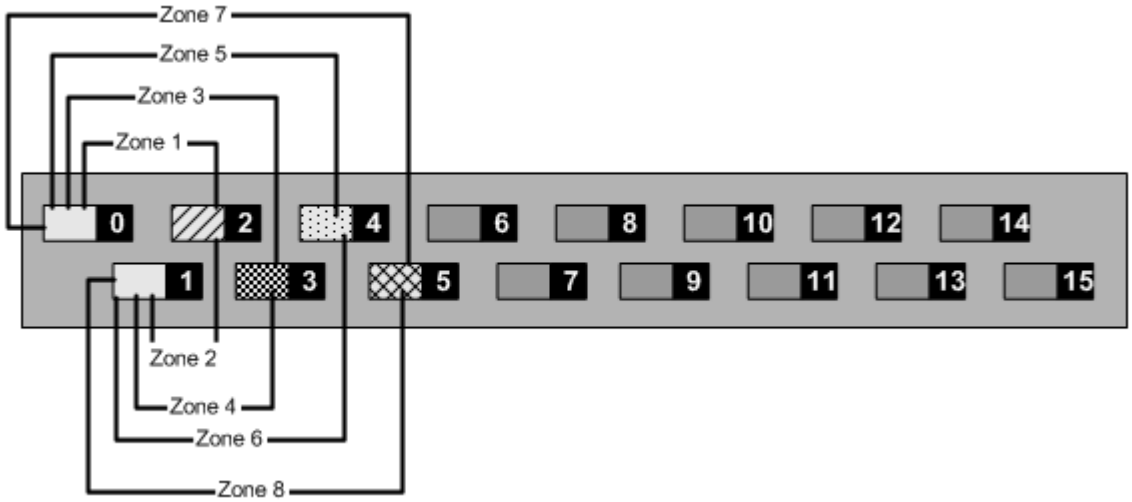


Figure 25: Four zones for each storage controller port

Replacing and Configuring Appliance Components

6

This chapter describes how to replace and/or configure appliance components:

- Creating and collecting logs, page 100
- Reconfiguring the shared storage array, page 101
- Replacing the hard disk drive, page 108
- Reconfiguring the host bus adapters, page 112
- Reconfiguring the Gigabit Ethernet card, page 118
- Reconfiguring the console switch user interface, page 121

Creating and collecting logs

If you need to replace an appliance component, the CASA support team may ask you to create and collect the appliance software logs. To do this, you must have network access to the appliance from either a customer workstation or your laptop. If you connect your laptop to the appliance node using a crossover Ethernet cable, ensure that your laptop has an IP address on the same subnet as the appliance nodes.

The CASA support team may also ask you to create a backup of the appliance configuration. Refer to "Backing Up and Restoring Files" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.

Note: For Windows 95/98 workstations, you must log in to the workstation as the administrator.

To create the logs:

1. Log in to `sanosadmin` on the appliance node and enter:

   `getlogs`
2. Repeat step 1 on the peer node.

To collect the logs:

1. From the desktop of your laptop or a customer workstation, click **Start > Run**.

   The **Run** dialog box opens.
2. Enter the appliance node's IP address in the **Open** box using the following format:

   `\\<ipaddress of appliance node>\C$`

   The **login** window opens.
3. Log in to the appliance node as follows:
   - User name—`administrator`
   - Password—`[D15K]`

   The folders on the `c:\` drive are displayed.

Note: Win95/98 workstations prompt for the password only. Use the password listed above.

---

4. Open the `logs` folder.
5. Copy *only* the ZIP file from the `logs` folder to your laptop or a customer workstation.
6. Repeat step 1 through step 5 on the peer node.
7. E–mail the logs to the CASA support team (support_team@hp.com) or contact the CASA support team to set up FTP access.

Reconfiguring the shared storage array

To replace the HP StorageWorks Virtual Array that serves as the shared storage between the peer nodes, refer to the *HP StorageWorks Virtual Arrays va7000 Family User and Service Guide* for instructions. This guide is available on the following HP web site:

http://h20015.www2.hp.com/content/common/manuals/lpg60187/lpg60187.pdf

After you have replaced the array and reconnected the cables between the nodes and the array, perform the following procedures:

- Configuring shared storage array parameters
- Detecting the array
- Creating a LUN
- Creating partitions on the shared storage array

Configuring shared storage array parameters

Connect the serial cable between a serial port on the appliance node and one of the controllers on the array. (Figure 1 on page 19 shows the location of the serial port on the appliance node.)

To configure the array:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Right-click on the window and click **Programs > Accessories > Hyperterminal > Hyper Terminal**.

   The **Connection Description** window opens.
3. Enter a name for the connection (such as `vasetup`) and click **OK**.

   The **Connect To** dialog box opens.
4. Click **COM1** and click **OK**.

   The **COM1 Properties** dialog box opens.
5. Ensure that the following settings are used and click **OK**:
   - Bits per second—`9600`
   - Data bits—`8`
   - Parity—`None`
   - Stop bits—`1`
   - Flow control—`None`
6. Press **Enter** twice to display a command prompt on the main **Hyper Terminal** window.
7. To display a list of help commands, enter:

   ```
   mgr -?
   ```
8. Set the following parameters for each controller:
   - Host type—Windows NT (`-os nt`)
   - Loop type—Private Loop (`-t 1`)
   - Port data rate—2 GB (`-S 2`)

9. Enter the following command:

   `mgr -os nt -t 1 -c 1 -S 2 -hp 1` (for controller 1 on host port 1)

10. When you see the following message, enter `n`:

```
Topology will be set to: Private Loop. Change will take
effect after a reset. Do you wish to reset now? (y/n)
```

11. Enter the following command:

    `mgr -os nt -t 1 -c 2 -S 2 -hp 1` (for controller 2 on host port 1)

12. When you see the following message, enter `y`:

```
Topology will be set to: Private Loop. Change will take
effect after a reset. Do you wish to reset now? (y/n)
```

13. Close the **Hyper Terminal** window.
14. Click **Yes** to disconnect.
15. Remove the serial cable connection.
16. Reboot both appliance nodes.

Detecting the array

To enable the peer node to detect the array:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Click **service viewer**.

   The **Services** window opens.

3. Select one of the following services and click **Start**:
   - HP OpenView SAM OpenDial
   - HP OpenView HostAgent
4. Repeat step 3 for the other service listed.
5. Close the **Services** window.
6. From the console window, press **Alt+C** to open a command prompt window.
7. At the `c:\` prompt, enter:

   `armdiscover`

Caution: The discovery process can take a few minutes. Canceling this process once it has started will corrupt the configuration.

When the discovery process is complete, the driver information is displayed, indicating successful detection of the array.

If the peer node does not detect the array, the following error message is displayed:

```
Device not found.
```

If this occurs, contact the CASA support team (support_team@hp.com).

Creating a LUN

After the peer node detects the shared storage array, create LUN 0 using the entire space on the array. Use the CommandView software or Hyper Terminal to create the LUN.

Using CommandView

To use CommandView to create LUN 0, you must first access the CommandView software.

Note: Complete this procedure on the peer node used in "Detecting the array."

Accessing CommandView

To access CommandView:

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **switchui** to open the Windows NT desktop. See "Using switchui" on page 28 for instructions.
3. Click **Start > Settings > Control Panel**.

   The **Control Panel** window opens.
4. Double-click **Network**.

   The **Network** window opens.
5. Double-click **Protocol**.

   The **Protocol** window opens.
6. Select **TCP/IP** and click **Properties**.

   The **Properties** dialog box opens.
7. Click **Advanced**.

   The **Advanced** dialog box opens.
8. Click **Configure** in the **Enable security** box.
9. Under TCP and UDP, select the **Permit All** options.
10. Exit all windows and reboot the appliance node when prompted.
11. Continue with "Creating LUN 0 using CommandView."

Creating LUN 0 using CommandView

To create LUN 0 using CommandView:

Note: Complete this procedure on the peer node used in "Detecting the array."

---

1. Ensure the **hp OV CASA Console** window is open in administrative mode.
2. Press **Alt+C** to open a command prompt window.
3. Enter the following command to start the CommandView services and to discover the disks:

   ```
   c:\rpic\utilities\StartCommandView
   ```

4. Enter the following command to open the CommandView user interface:

   ```
   c:\sanmgr\commandview\client\sbin\launcher.cmd
   ```

   The **CommandView** window opens.
5. Click the **LUN Management** tab.
6. Click **Create LUN**.
7. Enter the LUN number, which is zero (`0`).
8. Click **1** in the **Redundancy Group** box.
9. In the **LUN Size** box, enter the amount of storage space that displays for Redundancy Group 1, which you created in step 8.
10. Click **OK**.
11. Close the **CommandView** window.
12. Press **Alt+C** to open a command prompt window.
13. To reinstate security on the appliance node, enter the following command:

    ```
    c:\rpic\utilites\SetPortSecurity E10001
    ```

14. Reboot the appliance node to detect the new LUN.

Using Hyper Terminal

Note: Perform this procedure on one controller of the array only.

To create a LUN using Hyper Terminal:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Right-click on the window and click **Programs > Accessories > Hyperterminal > Hyper Terminal**.

   The **Connection Description** window opens.
3. Enter a name for the serial port connection and click **OK**.

   The **Connect To** window opens.
4. Click **COM1** and click **OK**.

   The **COM1 Properties** window opens.
5. Press **Enter** twice to display a command prompt on the main **Hyper Terminal** window.
6. Enter:

   `vfpcfg -L y -a xxG -g1`

   For `y`, specify zero (0) as the LUN.

   For `xx`, specify the maximum storage capacity.
7. Close the **Hyper Terminal** window.
8. Reboot the node so it can detect the new LUN.

Creating partitions on the shared storage array

The shared storage array stores configuration information for both appliance nodes. The array also enables the appliance nodes to monitor communication between its peer node and the shared storage array. You must create seven partitions on the array in which to store to configuration information.

This section describes the following topics:

- Partitions overview
- Creating the partitions

Partitions overview

You create the following partitions on the shared storage array:

- **E:** and **F:** — Store node heartbeat information. Each node has read-write access to one partition and read-only access to the other. For example, one node can have read–write access to `E:\` and read–only access to `F:\`; the other node has read–only access to `E:\` and read–write access to `F:\`.

  Every few seconds, each node sends a heartbeat to the partition to which it has read–write access. The heartbeat is a small data packet that includes a time stamp. The node then checks the heartbeat on the partition to which it has read–only access. If the node does not detect a heartbeat on the read–only partition within 30 seconds, it reports that its peer node has failed. The node then assumes ownership of the configuration information on the `I:\` partition (explained below) until its peer node resumes operation.
- **G:** and **H:** — Store the journal files for mirroring operations. Peer node 0 uses `G:\` and peer node 1 uses `H:\`.
- **I:** — Stores the configuration information for the storage network. Both peer nodes can access this partition, which contains LUN mapping information, host numbers, DPF configuration information, mirroring operations, and point-in-time image assignments. The partition has a file sharing algorithm to ensure that each node queries its peer before writing data to the partition. This prevents data corruption, enabling you to determine if the partition is in use.
- **J:** — Stores information about point-in-time image activity.
- **Q:** — Stores information about asynchronous IP mirroring operations. The partition is also referred to as the asynchronous IP mirror queue.

Creating the partitions

You can perform this procedure from the appliance or from your laptop if it is connected to the same network as the appliance. To create partitions on the shared storage array:

1. On node 0, ensure the **hp OV CASA Console** window is open in administrative mode.
2. Click **service viewer**.

   The **Services** window opens. The services applicable to this procedure are:

   - Identification and Authorization Server
   - RPIC DPF
   - sv3000 Management Server (SMS)
   - Tomcat
   - VA Status Monitor (VSM)
   - WebServer
3. Select a service and click **Stop**.

   The status of the service changes to **Inactive**.
4. Repeat step 3 for each service listed in step 2.
5. Close the **Services** window.
6. From the console window, press **Alt+C** to open a command prompt window.
7. Enter the following to display the `c:\` prompt:

   ```
   cd \
   ```
8. Enter the following to display the `rpic` folder:

   ```
   cd rpic
   ```
9. Enter the following to display the `utilities` folder:

   ```
   cd utilities
   ```
10. Enter the following to view the contents of the `utilities` folder:

    ```
    dir
    ```
11. Enter the following to format the partitions on the shared storage array:

    ```
    pardisk -pro
    ```
12. Enter `y` at the prompt that displays.

    This creates drives `E:\` and `F:\` (100 MB each), drives `G:\`, `H:\`, `I:\`, and `J:\` (2 GB each), and drive `Q:\` (remaining space on the array). Each drive is formatted as FAT.

Note: When performing this procedure as part of a reinstallation (see "Reinstalling the Appliance Software" on page 123), enter `n` at the prompt that displays to ensure you do not overwrite existing data on the partitions.

---

13. Switch the console window to node 1.
14. Repeat steps 1 through 12 on node 1.
15. Restart the software services on the appliance nodes. (See "Starting the software services" on page 47 for instructions.)

Replacing the hard disk drive

Before you replace the hard disk drive, ensure you have the following:

- Latest SANOS image CD
- PowerPath patch, if using EMC storage
- Hard disk drive with the following specifications:
  - Part number—289241-001
  - Description—SPS-DRV, HD, 36GB, U320, 15K, HP
  - Assembly number—286780-001

Verify that the customer has backed up the appliance configuration regularly. Also verify that the customer has saved the backup locally and on the peer node.

To replace and configure the hard disk drive:

1. Verify that the latest backup for both nodes is available on the peer node's hard disk drive.

Caution: If the latest backup is not available, do not continue with the replacement. Contact the CASA support team for assistance.

2. Record the following information in order to complete the **CASA setup utility** window:
   - General node settings:
     - Node name
     - Node ID
     - Appliance's serial ID
     - Local node's peer Interlink IP address
   - MirrorLink:
     - Local node's mirror IP address and subnet mask
     - Local node's mirror gateway IP address (if applicable)
   - InterLink:
     - Local node's InterLink IP address and subnet mask
     - Local node's InterLink gateway IP address (if applicable)
   - LAN Interface:
     - Local node's Management Link address and subnet mask
     - Local Node's Management Link gateway IP address (if applicable)
3. If you have not done so already, power down the defective node.
4. Remove the Ethernet cables from the appropriate node ports and the fiber cable from the shared storage array port. Ensure the Ethernet cables are properly labeled with the port information.
5. Replace the defective hard disk drive with the new hard disk drive.
6. Connect the Ethernet cables to the appropriate node ports; connect the fiber cable to shared storage array port.

7. Follow steps 1 through 21 in "Reinstalling the appliance software" on page 124 through page 128 to reinstall the appliance software.
8. Set the console display to the peer node. Ensure the **hp OV CASA Console** window on the peer node is open in administrative mode.
9. Press **Alt+C** to open a command prompt window and enter:

   ```
   cd \
   ```

10. To access the registry editor, enter:

    ```
    regedit
    ```

    The **Registry Editor** window opens (Figure 26).
11. Click **HKEY_LOCAL_MACHINE > SYSTEM > DISK**.
12. From the menu bar, click **Registry > Export Registry File**.

    The **Export Registry File** window opens (Figure 27).
13. Under **Export range**, ensure that **Selected branch** is selected and the box is populated with the following text:

    ```
    HKEY_LOCAL_MACHINE\SYSTEM\DISK
    ```

14. Save the exported file in the `c:\` directory as follows (Figure 27):
    - File name—`tempPeerReg`
    - Save as type—`Registration File`
15. Click **Save**.
16. Close the **Registry Editor** window.
17. From the console window, click **backup\restore > restore**.

    The **Restore** window opens.
18. Enter `p` at the `Restore type` prompt.
19. Press **Enter** at the `Restore from location < c: default >` prompt.

    A list of all backups stored in the selected location is displayed.
20. Enter the number of the most recent restore at the `Restore number <or q to quit>` prompt.
21. Enter `y` at the `Continue? (y/n/q)` prompt.
22. To authenticate the SANOS administrator account, specify the following:
    - Login name
    - Password

    This copies the SANOS configuration information to the node with the new hard disk drive.
23. Press any key when the following messages are displayed:

    ```
    Restore to peer node successfully completed.
    Done
    ```

24. Set the console display to the node with the new hard disk drive.

25. Press **Alt+C** to open a command prompt window and enter:

    ```
    cd \
    copy \\PeerInterLinkAddress\C$\tempPeerReg.reg
    regedit
    ```

    The **Registry Editor** window opens.
26. Click **Registry > Import Registry File**.

    The **Import Registry File** dialog box opens.
27. Select the `tempPeerReg.reg` file from the `c:\` drive and click **Open**.
28. Click **OK** when the **Registry Editor** window opens.
29. Close the **Registry Editor** window.
30. Ensure that all cables are connected to the appropriate node ports.
31. From the **hp OV CASA Console** window, click **service viewer**.

    The **Services** window opens.
32. Select one of the following services and set the startup type to **Automatic**:
    - Identification and Authorization Server
    - RPIC DPF
    - sv3000 Management Server (SMS)
    - Tomcat
    - VA Status Monitor (VSM)
    - WebServer

    Repeat this step for each service listed.
33. Reboot the node.
34. After the node reboots, verify that the services have started successfully.
35. From the console window, click **sanos admin > launch**.

    The `sanosadmin` window opens.
36. Log in to `sanosadmin` using the SANOS administrator account information entered in step 22.
37. To verify that the nodes can detect each other, enter:

    ```
    get node
    ```

Note: If the customer uses IP mirroring, the `get node` command displays the IP address and name of the mirror and proxy nodes.

---

38. Repeat step 37 on the other node.
39. If you modified the appliance configuration and/or user–related databases after the latest backup, you will not see those changes on the node. You must enter the changes manually using either `sanosadmin` or the user interface.
40. Install the appropriate back–end path failover software on the appliance node, if applicable.

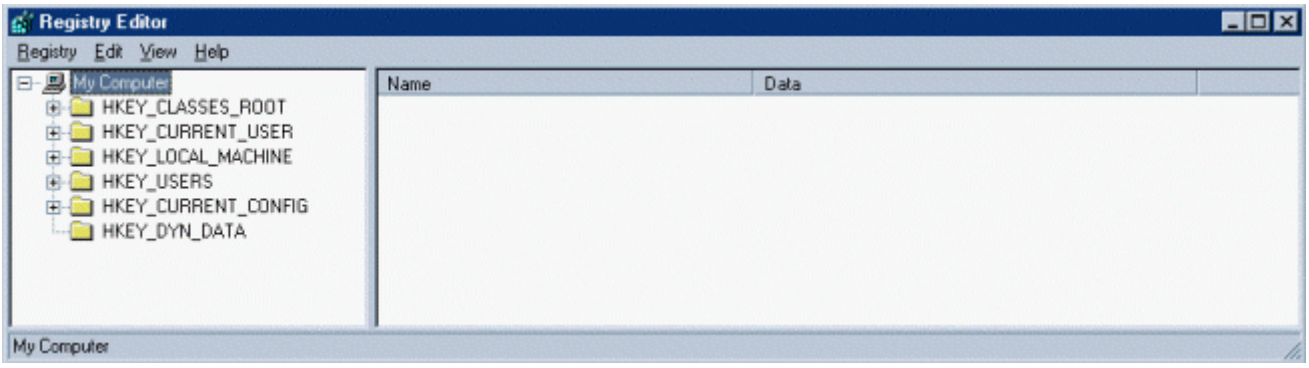


Figure 26: Registry Editor window

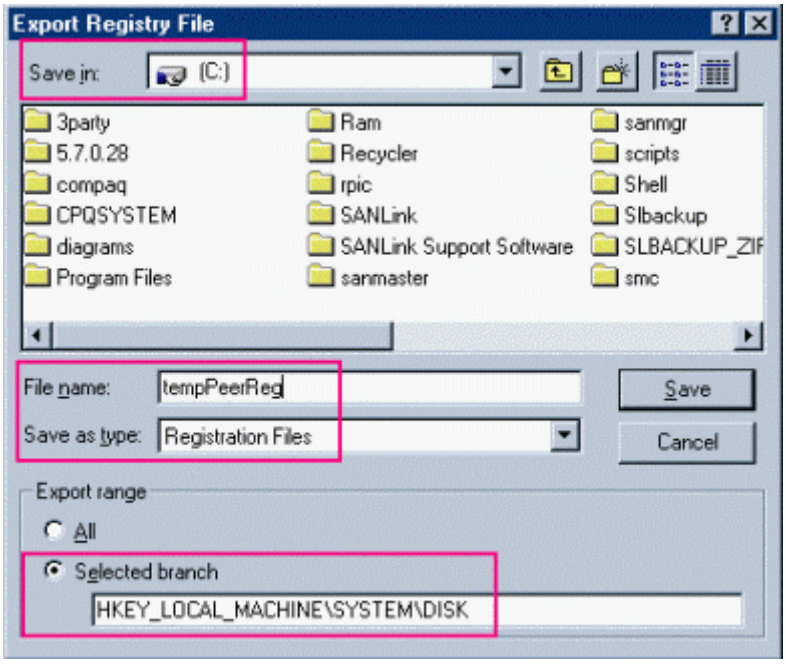


Figure 27: Export Registry File dialog box

Reconfiguring the host bus adapters

This section describes the procedures for:

- Replacing an HBA
- Resetting the firmware parameters for an initiator HBA
- Updating the HBA firmware

Replacing an HBA

This section describes the procedures for:

- Replacing the shared storage initiator HBA
- Replacing a target/initiator HBA

The HBA replacement specifications follow:

- Part number—A7546-69001
- Description—QLogic 2344F four–port full– profile HBA
- Assembly number—A7546-60001

Replacing the shared storage initiator HBA

To replace the shared storage initiator HBA:

1. Power down the appliance node with the defective adapter.
2. Disconnect the storage cables from this appliance node.
3. Disconnect the shared storage Fibre Channel cables from the defective adapter.
4. Replace the defective adapter.
5. Connect the shared storage Fibre Channel cables to the new adapter.

Note: Do *not* connect the storage cables to the appliance node at this time.

---

6. Power up the appliance node.

Note: Ensure that the new adapter's BIOS complies with the current SANOS version. If it does not comply, see "Resetting the firmware parameters for an initiator HBA" on page 115 before continuing with this procedure.

---

7. Click **OK** when the following message is displayed:

   ```
   At least one service or driver failed during system startup...
   ```

8. Ensure the **hp OV CASA Console** window is open in administrative mode.
9. Press **Alt+C** to open a command prompt window.
10. To locate the `Shared Disk SCSI Address` parameter in the `sanlink` log, enter:

    ```
    c:\sanlink\www\logs\sanlink.log | find "verifySharedDiskScsiAddress"
    ```

This command displays the contents of the `sanlink` log, including the search string and a four–digit number as follows:

```
verifySharedDiskScsiAddress - Shared Disk found at 4 0 0 0.
```

11. Search the log to find a four–digit number that is *not* equal to `4 0 0 0`, such as:

    ```
    verifySharedDiskScsiAddress - Shared Disk found at 6 0 0 0.
    ```

12. Record the number that you find.
13. To open the `sanlink.cfg` file in Notepad, enter:

    ```
    cd c:\Rpic
    notepad sanlink.cfg
    ```

14. Locate the string `SharedDiskScsiAddress=X X X X`, where `X X X X` is the SCSI address of the shared storage array.
15. Change the value of `X X X X` to the number you recorded in step 12.
16. Save and close the `sanlink.cfg` file.
17. Return to the **hp OV CASA Console** window and click **service viewer**.

    The **Services** window opens.

18. Select the **RPIC DPF** service, set it to **Automatic**, and then click **Start**.
19. After RPIC DPF has started, repeat step 18 for the **SMS** service.
20. Close the **Services** window.
21. Select **sanos admin > launch** from the console window:
22. Log in to `sanosadmin` and enter:

    ```
    mod hba -updatehbas
    ```

23. When you receive a message that the HBA(s) have been updated, exit `sanosadmin`.
24. Press **Alt+C** to open a command prompt window and enter:

    ```
    cd C:\Rpic
    notepad sanlink.cfg
    ```

    The `sanlink.cfg` file opens in Notepad.

25. Locate the string `SharedDiskScsiAddress=X X X X` and change the value to `4 0 0 0`.
26. Save and close the `sanlink.cfg` file.
27. Connect the storage cables to the appliance node.
28. Reboot the appliance node.
29. After the node reboots, verify that all services have started successfully.
30. Open `sanosadmin` and enter:

    ```
    mod hba -updatetargets
    ```

31. To verify that the nodes can detect each other, enter:

    ```
    get node
    ```

32. Repeat step 31 on the other appliance node.
33. Perform a backup on both appliance nodes.

Replacing a target/initiator HBA

To replace a target or initiator HBA:

1. Power down the appliance node with the defective adapter.
2. Disconnect the shared storage Fibre Channel cables from the defective adapter.
3. Replace the defective adapter.
4. Power up the appliance node.

Note: Ensure that the new adapter's BIOS complies with the current SANOS version. If it does not comply, see "Resetting the firmware parameters for an initiator HBA" on page 115 before continuing with this procedure.

---

5. From the console window, click **sanos admin > launch**.
6. Log in to `sanosadmin` and enter:

   ```
   mod hba -updatehbas
   ```
7. When you receive a message that the HBA(s) have been updated, exit `sanosadmin`.
8. Connect the shared storage Fibre Channel cables to the new adapter.
9. Reboot the appliance node.
10. From the console window, click **sanos admin > launch**.
11. Log in to `sanosadmin` and enter:

    ```
    mod hba -updatetargets
    ```
12. To verify that the nodes can detect each other, enter:

    ```
    get node
    ```
13. Repeat step 12 on the other appliance node.

Resetting the firmware parameters for an initiator HBA

To reset an initiator HBA's firmware parameters:

Note: The firmware parameters for the target HBAs are set when the target driver loads during RPIC DPF setup.

1. Reboot or turn on the appliance node.
2. When prompted, press **Ctrl+Q**.

   The **Select Host Adapter** menu opens, listing the available HBAs in scan order.
3. Select the first adapter and press **Enter**.

   The **Fast!UTIL Options** menu opens.
4. Click **Configuration Settings** and press **Enter**.
5. Click **Host Adapter Settings** and press **Enter**.
6. To select a parameter, highlight the parameter name and press **Enter**. Then specify the value for the parameter listed below.
   - Host Adapter Bios—`Disabled`
   - Frame Size—`2048`
   - Loop Reset Delay—`5`
   - Adapter Hard Loop ID—`Disabled`
   - Hard Loop ID—`0`
   - Spin up Delay—`Disabled`
   - Connection Option—`2`
   - Fiber Channel Tape Support—`Disabled`*****
   - Data Rate—`2`

   An asterisk (*) indicates that you must change the parameter to the value listed. Parameters without an asterisk show the default value; do not change this value.
7. Press **Esc** to return to the **Configuration Settings** menu
8. Click **Advanced Adapter Settings** and press **Enter**.

9. To select a parameter, highlight the parameter name and press **Enter**. Then specify the value for the parameter listed below.
   - Execution Throttle—`90*`
   - Luns per Target—`8`
   - Enable LIP Rest—`No`
   - Enable LIP Full Login—`Yes`
   - Enable Target Reset—`Yes*`
   - Login Retry Count—`60*`
   - Port Down Retry—`30*`
   - Link Down Timeout—`0`
   - Extended Error Logging—`Enabled*`
   - RIO Operation Mode—`5*`
   - Interrupt Delay Timer—`0`

   An asterisk (*) indicates that you must change the parameter to the value listed. Parameters without an asterisk show the default value; do not change this value.
10. Press **Esc** to return to the **Configuration Settings** menu.
11. Press **Esc** again.

    The **Configuration settings modified** menu opens.
12. Click **Save changes** and press **Enter**.

    The **Fast!UTIL Option** menu opens.
13. To reconfigure another HBA, click **Select Host Adapter** and repeat steps 3 through 12.
14. From the **Configuration Settings** menu, click **Raw Nvram Data**.

    The **Raw Nvram Data** window opens.
15. Verify the HBA type of each adapter. Check the value at the intersection of `F0` and `0A`. The value for initiator HBAs is 77; the value for target HBAs is 28.
16. When you finished reconfiguring adapters, click **Exit Fast!UTIL** and press **Enter**.

    The **Exit Fast!UTIL** menu opens.
17. Click **Reboot System** and press **Enter**.

Updating the HBA firmware

You may need to update the firmware of the node's HBAs if a bug is found in the firmware.

Before updating the firmware:

1. Verify the firmware version supported on the appliance:
   a. Access the following internal HP web site:
      http://turbo.rose.hp.com/spock/
   b. Locate the **Storage Virtualization** section.
   c. Select the appropriate support matrix for the appliance.
2. Format a bootable disk from your desktop:
   a. Download the boot utility from
      ftp://casa2dvr:postwar4@hprc.external.hp.com/biosboot.exe
   b. Save the utility to the root directory of your `c:\` drive.
   c. Insert an unformatted disk into the disk drive.
   d. Open a command prompt window and enter:

      ```
      c:\biosboot a:
      ```
3. Download the firmware:
   a. Go to www.qlogic.com.
   b. Click **Downloads**.
   c. Click the **SANblade 2300** series and select the specific QLogic card from the list.
   d. Scroll to the **Software** section and locate the download link for the BIOS version.
   e. Download the BIOS version to your `a:\` drive.
   f. Locate the file in **My Computer > Floppy Drive**, and double-click it.
   g. When prompted for a directory, enter `a:\` and click **Unzip**.
   h. When finished, click **OK** and then click **Close**.

To update the firmware:

1. Power down the appliance node.
2. Insert the bootable disk into the disk drive and power on the appliance node.

   To skip the memory test during bootup, press the space bar. When bootup is complete, the `a:\>` prompt is displayed.
3. Remove the bootable disk and insert the disk on which you copied the BIOS version.
4. At the `a:\>` prompt, enter the following command to change to the flash directory:

   ```
   cd flash
   ```

   The directory changes to `a:\flash`.
5. Enter the following command (including the spaces):

   ```
   flasutil /m /f
   ```

   All HBAs are scanned and updated to the current version. When the process is completed, the `a:\flash>` prompt is displayed.
6. Remove the disk and reboot the appliance node.

Reconfiguring the Gigabit Ethernet card

This section describes the procedures for:

- Replacing the Gigabit Ethernet card
- Reconfiguring the driver

The Gigabit Ethernet card replacement specifications as follows:

- Part number—A7547-69001
- Description—Dual–port Gigabit Ethernet Card
- Assembly number—A7547-60001

Replacing the Gigabit Ethernet card

To replace the Gigabit Ethernet card:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. Click **service viewer**.

   The **Services** window opens.
3. Select the **RPIC DPF** service, set it to **Manual**, and then click **Stop**.
4. Repeat step 3 for the **SMS** service.
5. Close the **Services** window.
6. From the console window, click **setup**.

   The **CASA setup utility** window opens.
7. Record the information that displays in this window.
8. Power down the appliance node with the defective card.
9. Disconnect the cables from the card.
10. Replace the defective card.
11. Connect the cables to the new card.
12. Power on the appliance node.
13. Ensure that the **hp OV CASA Console** window is open in administrative mode.
14. Click **setup**.

    The **CASA setup utility** window opens.
15. Enter the network information you recorded in step 7 and click **OK**.
16. Click **OK** when the following message is displayed:

    ```
    The operation completed successfully. Please reboot this
    machine for the changes to take effect.
    ```

Note: Do *not* reboot the node at this time.

---

17. Click **service viewer**.

    The **Services** window opens.
18. Select the **RPIC DPF** service and set it to **Automatic**.

19. Repeat step 18 for the **SMS** service.
20. Close the **Services** window.
21. Reboot the appliance node.
22. Verify that all services have started successfully.
23. From the console window, click **sanos admin > launch**.
24. Log in to `sanosadmin`.
25. To verify that the peer node information is correct, enter the following command:

    ```
    get node
    ```
26. Repeat step 25 on the peer node.
27. Perform a backup on the appliance node for which the Gigabit Ethernet card was replaced. From the console window, click **backup\restore > backup**.

Reconfiguring the driver

If you update the driver of the Gigabit Ethernet card, you must reconfigure the driver.

Note: You do not have to reconfigure the driver if the Gigabit Ethernet card is being replaced.

To reconfigure the driver:

1. Power on the appliance node.
2. Ensure that the **hp OV CASA Console** window is open in administrative mode.
3. Right click the console window and click **Network Neighborhood > Properties**.

   The **Properties** window open.
4. Click **Adapters** and click **Add**.
5. Click **Have Disk**.

   The **Insert Disk** window opens.
6. Select the following series of folders and click **OK**:

   `c:\Sanlink Support Software\Intel Gigabit Adapter Driver\NT 4`

   The **Select OEM Option** window opens with **Intel (R) PRO/1000 Adapter** selected.
7. Click **OK**.

   The **Windows NT Setup** window displays the files being copied. When copying is complete, the **Network** window displays the following two cards:

   - HP NC7781 Gigabit Server Adapter Bus 1
   - Intel(R) PRO/1000 Gigabit Ethernet Adapter
8. Click **Close** to update the configuration.

   The **Microsoft TCP/IP Properties** window opens.
9. Click **Intel (R) PRO/1000 Adapter** from the list in the **Adapter** box.
10. Enter the IP address and subnet mask (provided by the customer) and click **Apply**.
11. Click **OK**.

    The following prompt is displayed:

    `Do you want to restart the computer?`
12. Click **Yes**.

Reconfiguring the console switch user interface

You use the HP console switch to move between appliance nodes and to run configuration procedures. When you replace the console switch, you must reconfigure the user interface for the console switch.

To reconfigure user interface, which is called the HP ID window:

1. Press **Ctrl** twice to access the console switch user interface.
2. Press **Ctrl** four times to access the **Administrator Command** menu.
3. Use the arrow keys to select **Add Port** and press **Enter**.
4. Select **ID Setup** and press **Enter**.
5. Press the arrow keys to position the HP ID window. (For example, you may want the HP ID window to open in the lower left corner of the monitor). To move faster, press and hold **Shift** as you press the arrow keys.
6. Press **Enter** to save the selected position.
7. To change the background color, press **Page Up** and select a color.
8. To change the text color, press **Page Down** and select a color.
9. To change the length of the window, press **+** or **–** accordingly.
10. To change the size of the window, press the space bar to toggle between large and small.
11. Press **Esc** to open the **Add Port** window.
12. Enter the name and address of the appliance node. (The address is the port number on the back of the node.)
13. Do not change the default values for ID Dwell Time and Scan Dwell Time.
14. Select **Save Changes** and press **Enter**.
15. To exit the ID window, press **Esc**.

Reinstalling the Appliance Software

7

This chapter describes how to reinstall the appliance software. You may need to reinstall the appliance software if one of the appliance nodes does not boot properly and troubleshooting efforts have not corrected the problem.

Note: Perform a reinstallation only if the CASA support team instructs you to do so.

This chapter describes the following topics:

- Reinstalling the appliance software, page 124
- What to do next, page 126

Reinstalling the appliance software

Use the image CD provided by HP support to reinstall the appliance software on the defective appliance node:

Caution: Disconnect the cables between the initiator ports on the defective appliance node and the external storage arrays.

1. Insert the image CD into the CD-ROM drive and reboot.

   The following prompt is displayed:

   ```
   WARNING! All partitions on this system will be deleted.
   Strike a key when ready...
   ```

Caution: If you inadvertently put the image CD in a node that has not been backed up and is not ready for the image, remove the image CD immediately when this prompt is displayed and reboot the node. Otherwise, you will delete everything on the node.

2. Press any key to continue with the image.
3. When the `Partition sizes correct?` prompt is displayed, select **Yes**.

   A primary partition of 16,386 MB is automatically created and is displayed in the window.
4. When the `Proceed with disk load?` prompt is displayed, select **Yes**.
5. When the following prompt is displayed, remove the image CD from the CD-ROM drive and reboot the node:

   ```
   E:\>
   Please eject the CD and reboot the appliance.
   E:\>
   ```
6. Ensure the **hp OV CASA Console** window is open in administrative mode.
7. Click **setup**.

   The **CASA setup utility** window opens.

Note: If you did not disconnect the cables between the initiator ports on the defective appliance node and any external storage before beginning this process, the `Shared Storage not available` error message is displayed. Click OK to disregard this message and continue with the setup.

8. Enter the network information for the appliance node and click **OK**. (See "Setting network properties" on page 42 for instructions.)
9. Click **OK** when the following message is displayed:

   ```
   The operation completed successfully. Please reboot this
   machine for the changes to take effect.
   ```

Note: Do *not* reboot the appliance node at this time.

Caution: Follow steps 11 through 14 carefully. Failure to do so may cause the appliance nodes to become inoperable.

10. Press **Alt+C** to open a command prompt window and enter the following command:

    ```
    c:\rpic\utilities\pardisk.exe
    ```

11. Enter `n` when the following prompt is displayed:

    ```
    Would you like to overwrite E: F: G: H: I: J: partitions?
    Y/[N]
    ```

12. Enter `n` when the following prompt is displayed:

    ```
    Would you like to reinitialize Drive Q for async IP
    mirroring? Y/[N]
    ```

13. Enter `y` when the following prompt is displayed:

    ```
    Would you like to remount shared drives and update drive
    letter's registry? Y/[N]
    ```

    The following message is displayed:

    ```
    WARNING! Make sure all SV3000 services are stopped on both
    peer nodes before you continue. Are you sure? Y/[N]
    ```

14. If you have followed this procedure correctly, all services on the nodes will have been stopped. You can first verify that the services have stopped (open another command prompt window or use **service viewer** on the console). When you are ready to continue, enter `y`.

Note: Wait until the `pardisk` command has finished before continuing with the next step.

15. On the console window, click **service viewer**.

    The **Services** window opens.

16. Ensure that the following services are set to **Automatic**:
    - Identification and Authorization Server
    - RPIC DPF
    - sv3000 Management Server (SMS)
    - Tomcat
    - VA Status Monitor (VSM)
    - WebServer
17. Reboot the appliance node.
18. On the console window, click **sanos admin > initialize**.
19. When prompted, enter the user name and password for the administrator account. Reenter the password when prompted.
20. To verify that the appliance nodes can detect each other, enter:

    ```
    get node
    ```

21. Repeat step 20 on the peer node.

Note: Install the appropriate back–end path failover software on the appliance node, if applicable.

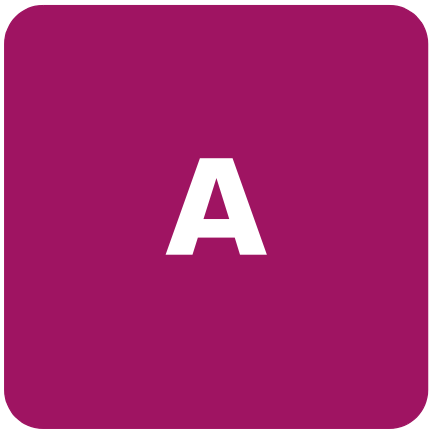
What to do next

To complete the reinstallation of the appliance software:

1. Set the date and time. (See "Setting the current date and local time" on page 31.)
2. Connect the cables between the appliance node and the storage arrays.
3. Initialize the user database. (See "Initializing the user database" on page 48.)
4. Perform a restore, if applicable.

   (Refer to "Backing Up and Restoring Files" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.)

IP Mirroring



This appendix provides information to help you implement and support IP mirroring at the customer site. For an overview of IP, refer to "Managing IP Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide*.

This appendix describes the following topics:

- Managing worker threads, page 128
- Processing synchronous IP mirroring requests, page 130
- Processing asynchronous IP mirroring requests, page 132
- Understanding resynchronization, page 133
- Troubleshooting IP mirroring, page 135

Managing worker threads

This section describes worker threads and how to use them for IP mirroring requests. It describes the following topics:

- Worker threads overview
- Adjusting the number of worker threads
- Using worker threads for many-to-one IP mirroring

Worker threads overview

The appliance software uses worker threads to process I/O requests. By default, each appliance node has 200 worker threads; typically, 100 are reserved for IP mirroring requests and 100 are reserved for non-IP mirroring requests. The number of worker threads is the same whether the appliance node is a mirror source or a mirror target. When a worker thread is processing a request, it is unavailable until it completes the request.

Note: If all worker threads are in use or busy, other requests must wait to be processed until a worker thread is available.

Adjusting the number of worker threads

If a customer requires more worker threads for IP mirroring requests, you can adjust the number of threads:

1. Ensure that the **hp OV CASA Console** window is open in administrative mode.
2. On the console window, click **service viewer**.

   The **Services** window opens.
3. Select the **RPIC DPF** service.
4. Click **Stop** and then click **Apply**.
5. Ensure that the service has stopped.
6. Repeat steps 4 and 5 for the **SMS** service.
7. Select the **RPIC DPF** service again and click **Start**.
8. In the **Startup Parameters** box, enter the following command (`[num]` is the number of worker threads for IP mirroring):

   ```
   -ipt [num]
   ```
9. Click **Apply** to restart the **RPIC DPF** service.
10. Select the **SMS** service, click **Start**, and click **Apply**.
11. Close the **Services** window.

Using worker threads for many-to-one IP mirroring

When implementing many-to-one IP mirroring, you must reduce the number of IP mirroring worker threads; otherwise, IP mirroring will not function properly.

The total number of IP mirroring worker threads for all source appliances cannot exceed 200. When calculating this number, count by appliance, not appliance node because only one appliance node can process IP mirroring requests at a time.

If three source appliances mirror data to one target appliance, the maximum number of IP mirroring worker threads for each source appliance is 66 (66 x 3 = 198). Set the number of IP mirroring worker threads to 66 on both nodes for each source appliance.

The target appliance cannot mirror data to a source appliance because it does not receive I/O from a host. Therefore, set the number of IP mirroring worker threads to 10 on each target appliance node. (See “Adjusting the number of worker threads” for instructions.)

Processing synchronous IP mirroring requests

This section describes how the appliance software processes synchronous IP mirroring requests. It describes the following topics:

- Synchronous IP mirroring process
- IP mirroring performance

Synchronous IP mirroring process

Processing synchronous IP mirroring requests involves the following steps (Figure 28):

1. The host sends a request to the local LUN.
2. An IP mirroring worker thread receives the request on the local LUN and sends it to a network thread on the remote LUN.
3. The worker thread completes the request on the local LUN.
4. A worker thread completes the request on the remote LUN.
5. The local LUN waits for a successful response from the remote LUN.
6. The worker thread on the remote LUN sends a successful response to the worker thread on the local LUN.
7. The worker thread on the local LUN receives the response from the remote LUN.
8. The local LUN sends a response to the host indicating that the request is complete.

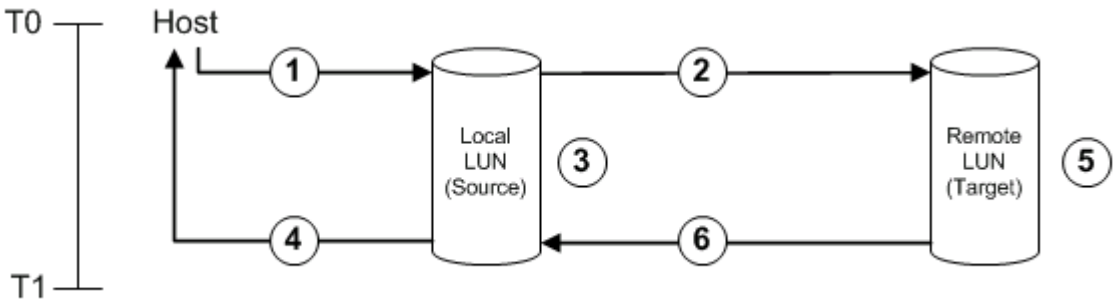


Figure 28: Processing a synchronous IP mirroring request

IP mirroring performance

In Figure 28, T0 indicates the time at which the host sends I/O to the local LUN, initiating the IP mirroring request. T1 indicates the time at which the host receives a completion message from the local LUN, ending the IP mirroring request. T0 and T1 are measured in milliseconds. For example, T0 is 10:35:02:15 and T1 is 10:35:03:20. To calculate IP mirroring performance, subtract T0 from T1.

The time it takes to complete the IP mirroring request on the local and remote LUNs does not typically change. The time is the same for each request because no other activity affect the completion of the request locally.

The time it takes to send the request to the remote LUN and for the remote LUN to send a response to the local LUN is typically changeable and may increase the time between T0 and T1. The time is different for each request because other factors affect the completion of the request remotely, such as:

- Network speed, which is determined by the:
  - Quality of the network connection
  - Distance between the appliances
- Other host/LUN activity that requires worker threads

You must establish the correct IP mirroring relationships to ensure that the local and remote appliances can communicate. Refer to "Managing IP Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.

Processing asynchronous IP mirroring requests

Processing asynchronous IP mirroring requests involves the following steps (Figure 29):

1. The host sends a request to the local LUN.
2. A worker thread receives the request on the local LUN and completes the request.
3. Another worker thread adds the replication request data to the asynchronous IP mirroring (AIPM) queue.
4. The first worker thread waits for the second worker thread to confirm that the request has been added to the AIPM queue. The first worker thread notifies the host that the request is complete.
5. The drainer sends the request from the queue to a network thread on the remote LUN.
6. The harvester thread waits for a successful response from the remote LUN. When the harvester thread receives a successful response, it removes the request from the AIPM queue.

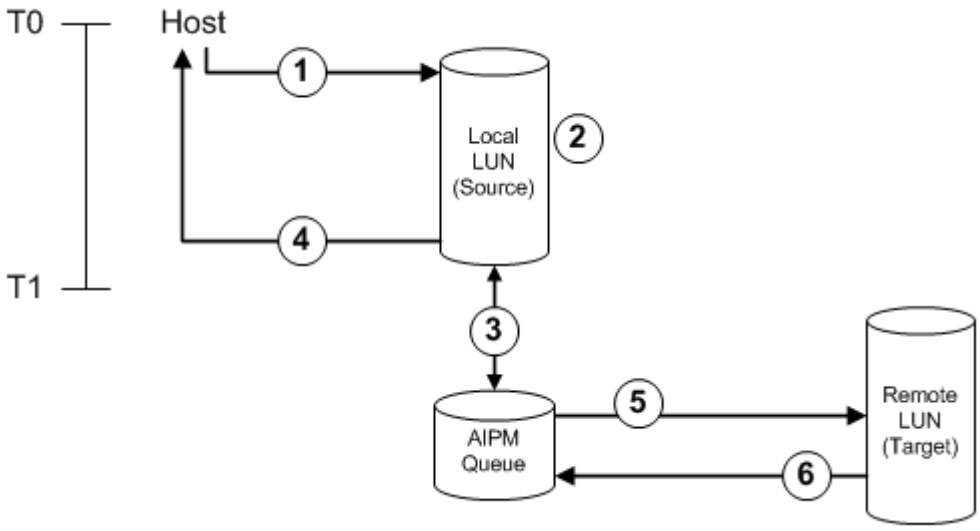


Figure 29: Processing an asynchronous IP mirroring request

Understanding resynchronization

This section describes the differences between resynchronizing synchronous and asynchronous IP mirrors. It describes the following topics:

- Synchronous IP mirrors
- Asynchronous IP mirrors
- Common resynchronization issues

Synchronous IP mirrors

If the network goes down, synchronous IP mirroring (and all other network activity) stops. During this down time, the appliance software tracks replication requests in the source LUN's journal file. After you restore the network connection, the appliance software uses the journal file to determine which data must be replicated on the target LUN.

Each resynchronization request requires a resynchronization thread. Any other requests initiated before the network went down are waiting for and/or using available worker threads. Therefore, the resynchronization and worker threads compete for network resources, increasing traffic on the network and causing it to slow down.

Asynchronous IP mirrors

Resynchronization and heavy network use do not affect asynchronous IP mirrors. Asynchronous IP mirroring only stops when:

- The asynchronous IP mirroring (AIPM) queue is full or drained.
- You pause the asynchronous IP mirror.

The worker threads for asynchronous IP mirrors do not use the network; they only transfer replication requests from the source LUN to the AIPM queue, which is a local connection. Therefore, worker threads and resynchronization threads do not compete for network resources.

Common resynchronization issues

A description of common resynchronization issues follows:

- **After you power off the resynchronizing node, synchronous IP mirrors disconnect.**

  Temporarily disconnecting the IP mirrors starts resynchronization on the new resynchronizing node, (the peer node that is working). Resynchronizing ensures that the data on the source and target LUNs of the mirrors is current.

- **After you reboot the mirror nodes, synchronous IP mirrors continually disconnect and resynchronize.**

  Synchronous IP mirrors disconnect when the network is saturated with I/O (regular requests and resynchronizations) or when the mirrors are grouped in a consistency set. To prevent the mirrors from disconnecting, limit the number of simultaneous resynchronizations to three or four. Do not use a consistency set for synchronous IP mirrors unless it is necessary.

- **After you disconnect the cable between an external storage array and the resynchronizing node, synchronous IP mirrors disconnect.**

  The resynchronizing node cannot perform a resynchronization if it does not have a physical connection to the storage array. However, normal I/O (non-resynchronizing I/O) continues. After you connect the node and the storage array, the node resumes its role as the resynchronizing node and resynchronization resumes.

- **When you set the value of the maxresyncthreads parameter to 1 and create several IP mirrors, you only see one mirror on the remote appliance when the mirror is resynchronizing.**

  The resynchronizing thread communicates with the mirror node when defining an IP mirror. If you only define one resynchronization thread, that thread must define the mirror and complete the resynchronization before defining the next mirror. To avoid this situation, do one of the following:

  — Create one IP mirror and wait for the resynchronization to complete before creating the next IP mirror.

  — Change the value of the maxresyncthreads parameter to the number of IP mirrors you are creating.

Troubleshooting IP mirroring

A description of common IP mirroring situations follows:

- **I/O stops on the hosts after disconnecting the InterLink and MirrorLink.**

  If you disconnect the InterLink and MirrorLink, the appliance loses all connectivity to the mirror site and enters arbitration. The appliance cannot enter arbitration until all I/O times out. To prevent I/O from timing out, increase the value of the I/O time–out parameter (for example, 10 minutes).

- **The IP mirror disconnects and I/O stops on the hosts when one MirrorLink is down.**

  For synchronous IP mirrors, this occurs because the active MirrorLink is saturated. The I/O must wait for network scheduling. To prevent I/O from timing out, increase the value of the I/O time–out parameter (for example, 10 minutes).

- **When a change occurs to the MirrorLink (either failure or restore), SMS may not detect the change for the mirror node immediately.**

  If there is a large number of mirrors resynchronizing, there may be a delay in updating the link state as the appropriate caches are updated for each mirror (specifically, the mirror cache, LUN cache, consistency set cache, and node cache). To update the status of the nodes immediately, enter the following command in `sanosadmin`:

  ```
  mod cache -name all -refresh
  ```

  See “mod cache” on page 171 for more information about this command.

- **After deleting an IP mirror, sometimes it is still visible from the remote appliance.**

  This occurs if you delete the IP mirror when the mirror site (remote appliance) is down. To prevent this situation, ensure the mirror site is up before you delete the IP mirror.

- **If the local and remote system administrators create a mirror using the same LUNs at exactly the same time (each thinks it is the source), the user interface indicates that both mirrors were successful, but only one mirror was.**

  It is unlikely that this situation will occur. However, HP recommends that the system administrator notify other system administrators before performing an IP mirror request. In a future release, the appliance’s user interface will reflect that only one mirror was successful.

- **Explain the most efficient way to create and maintain IP mirrors for multiple applications.**

  Create a consistency set for each application. For example, your Oracle database uses LUNs 1, 2, and 3; your web applications use LUNs 4 and 5. Create two consistency sets, named **oracle** and **webapps**, for example. Assign LUNs 1, 2, and 3 to the **oracle** consistency set; assign LUNs 4 and 5 to the **webapps** consistency set. Write ordering is maintained within each group, ensuring data consistency on the remote site.

Appliance Components

B

This appendix describes each appliance component and lists its physical dimensions, technical specifications, and environmental operating conditions:

- HP ProLiant ML370G3 server, page 138
- HP StorageWorks Virtual Array 7110, page 139
- HP rack system/E, page 140
- HP rackmount console switch, page 141
- HP rackmount keyboard and monitor, page 142
- QLogic SANBlade QLA2344 series host bus adapters, page 144
- Intel PRO/1000 MT dual–port server adapter, page 145

HP ProLiant ML370G3 server

Each appliance uses two servers, also called nodes. Each node is an HP ProLiant ML370G3 server; the appliance software is installed before it ships.

The nodes are defined as peer nodes in an active-active configuration, which means that both nodes actively monitor and maintain the storage network.

For more information on this server, refer to the *ProLiant ML370 Generation 3 Server Setup and Installation Guide*. This guide is available from the following HP web site:

http://wwss1pro.compaq.com/support/reference_library/viewdocument.asp?countrycode=1000&prodid=5479&source=281992-001.xml&dt=262&docid=16266

Technical specifications

Type	Description
Processor	Intel Xeon 2.80 GHz processor
Hard drives	Six one-inch hot pluggable hard drive bays
Memory	1 GB Advanced ECC PC2100 DDR SDRAM running at 200 MHz
Cache memory	512 KB second-level ECC cache
Network controller	NC7781 PCI-X Gigabit NIC (embedded) 10/100/1000 WOL (Wake on LAN)
Storage controller	Integrated dual channel wide Ultra3 SCSI adapter
System dimensions	8.69 x 19.0 x 25.75 inches 22.07 x 48.26 x 65.43 cm
Weight	65 pounds/29.48 kg (without hard drives, no RPS)
Power supply	500 Watt-CE Mark hot plug
Operating temperature	+5° C to +35° C (41° F to 95° F)
Storage temperature	–40° C to +85° C (–40° F to 185° F)
Relative humidity (non-condensing)	5% to 95%

HP StorageWorks Virtual Array 7110

The Virtual Array 7110 (va7110) is the shared storage array between the two nodes. It contains the configuration information that both nodes monitor and maintain. To avoid data corruption, a file–sharing system ensures that only one node has write access to the array at any time.

For more information on the array, refer to the *HP StorageWorks Virtual Arrays va7000 Family User and Service Guide*. This guide is available on the HP web site at the following address:

http://h20015.www2.hp.com/content/common/manuals/lpg60187/lpg60187.pdf

Technical specifications

Type	Description
Native capacity	6.5 TB
External I/O ports	Two 2 GB/s or 1 GB/s Fibre Channel ports
Sustained performance	164 MB/s read
Memory cache	Up to 2 GB mirrored cache
Cache (internal)	Up to 2 GB per controller
Current (maximum two power inputs)	8.2 A @ 100 VAC 3.4 A @ 200 VAC
Power consumption	473 W @ 120 VAC 457 W @ 240 VAC
Power supply	100-240 Vac auto-ranging, 50-60Hz
Dimensions (H x W x D)	5.0 x 17.6 x 20.0 inches (12.7 x 44.7 x 50.8 cm)
Weight (shipping)	101.5 pounds
Temperature range	Operating: 5º C to 35º C (41º F to 95º F) Storage: –40º C to 70º C (–40º F to 158º F)
Humidity range	Operating: 15 to 80% @ 28º C (dry bulb) Storage: 5 to 95% @ 149º F/ 65º C (dry bulb)

HP rack system/E

The HP rack system/E (part number J1500A) holds the appliance components.

Rack specifications

Type	Description
Weight	Empty rack: 162 pounds ■ Packaged rack: 314 pounds ■ Rear door: 29 pounds
Supported weight	Load capacity: ■ On shipping pallet: 1800 pounds (816 kg) ■ Off shipping pallet: 2000 pounds (907 kg) ■ Casters rating: 1000 pounds (453.6 kg) per caster)
Rack size	41U[1]
Rack dimensions W x D x H (inches)	23.5 x 36.5 x 77.5 inches (.6 m x .9 m x 1.96 m)
Packaged dimensions W x D x H (inches)	40 x 48 x 86.5 inches (1.02 m x 1.22 m x 2.2 m)

1. One “U” equals to 44.45 mm (1.75 inches)

HP rackmount console switch

The HP rackmount console switch enables you to switch between nodes from the appliance monitor.

You can use either the four-port console (part number J1473A) or the eight-port console (part number J1474A).

Specifications

Type	Description
Height	1.75 inches (44.4 mm)
Width	17.2 inches (436.9 mm)
Length	6.5 inches (165.1 mm)
Weight	4.5 pounds (20 kg)
Voltage	100–240 VAC, 50–60 Hz
Number of ports	4 or 8

HP rackmount keyboard and monitor

The appliance is installed with one of the following HP rackmount keyboard and monitor sets:

- J1470A—Requires 2U[1] (EIA units) of space
- TFT5600RKM—Requires 1U of space

J1470A specifications

Type	Description
Display	15 inches
Type	Active matrix TFT
Resolution	1024 x 768
Weight	12.5 lbs (15.6 kg)
Horizontal dot pitch	0.297 mm
Brightness	220 nits (cd/m2)
Display colors	16.7 million
Pixel pitch (horizontal x vertical)	0.297 x 0.297
Synchronization frequencies	Horizontal 30–61 Hz Vertical 50–75 Hz 1024 x 768, up to 75 Hz
Dimensions (width x depth)	19 inches x 29.3 inches (482.6 mm x 743 mm)
Power source	AC 100–240 volt ±10%, 60 Hz/50 Hz±3 Hz
Maximum power consumption	30 W

1. One “U” equals to 44.45 mm (1.75 inches)

TFT5600RKM specifications

Type	Description
Display	15 inches
Type	Active matrix TFT LCD
Resolution	1024 x 768
Weight	13.75 lbs (6.25 kg)
Horizontal dot pitch	0.29 mm
Horizontal frequency (LCD)	48.2 KHz
Vertical frequency (LCD)	60 Hz
Pixel clock speed	65 MHz
Dimensions (length x width x depth)	17 x 1.7 x 15.6 inches (4.32 x 39.6 x 43.2 cm)
Power source	90–264 VAC, 47–63 Hz
Maximum power consumption	50 W
Operating temperature	50º F to 122º F (10º C to 50º C)
Storage temperature	32º F to 140º F (0º C to 60º C)

QLogic SANBlade QLA2344 series host bus adapters

The appliance has three (3) QLogic 2344 host bus adapters (HBAs) per appliance node, for a total of six HBAs per appliance.

The QLogic HBAs provide:

- Data transfer rate of 400 MB/s (full–duplex operation)
- 64-bit 133 MHz PCI-X
- Direct connection to copper-based and multimode optic cable media
- F-port and FL-port fabric login
- Class 2 and 3 Fibre Channel services
- SCSI and IP protocol support
- 300,000 I/O operations per second

General specifications

Type	Description
Fibre Channel chip	ISP2300, ISP2310
RISC processor	106 MHz
RAM	256 KB, scalable to 4 MB
Frame buffers	■ Integrated 10 KB frame buffer FIFO ■ Receive FIFO = 6 KB, transmit FIFO = 4 KB ■ Optional external frame buffer FIFO for longer distances when using single mode optics
Topology	FC-AL, FC-AL-2, Point-to-Point, Switched Fabric
Fabric support	FL-Port, F-Port
Class of service	Class 2 and 3 Fibre channel services
Transfers	Full duplex in all topologies
Protocols	SCSI, IP, and Virtual Interface (VI) concurrently; FC tape
Fibre Channel data transfers	Up to 400 MB/s per channel (full duplex)
Operating temperature	0º C to 55º C (32º F to 131º F)
Storage temperature	–20º C to 70º C (–4º F to 158º F)
Relative humidity	–10% to 90% (noncondensing)
Storage humidity	5% to 95% (noncondensing)
Power consumption	Fiber Optic: <6–12 W

Intel PRO/1000 MT dual–port server adapter

The appliance has one dual–port Gigabit Ethernet card per appliance node. The top port is for the MirrorLink connection (IP mirroring); and the bottom port is for the InterLink connection between the nodes.

General specifications

Type	Description
Connectors	Two RJ-45 connectors
IEEE standard/network topology	10BASE-T, 100BASE-TX, 1000BASE-T
Wiring	Cat-5, 4 pair
Features	Auto-negotiation Full-duplex cable
Cable length	100m

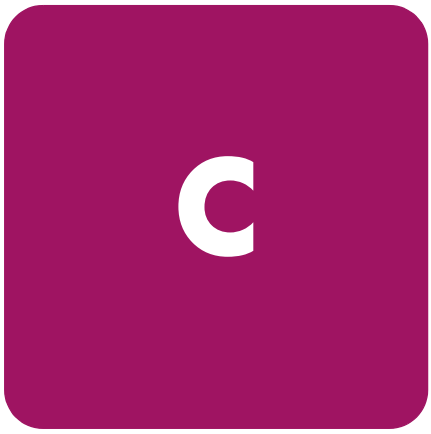
Technical specifications

Type	Description
Data rate(s) supported per port	10, 100, 1000 Mbps
Bus type	PCI/PCI-X
Bus width	32- or 64-bit
Bus speed (MHz)	33/66/100/133
Onboard memory	128 KB
IEEE support	IEEE 802.3ab
Hardware certifications	FCC A, CE
Data transfer mode	Bus-master DMA
Controller–processor	Intel 82546EB
Power consumption	1A at +5 VDC
Operating temperature	0–55° C
Operating humidity	85% at +55° C

Physical dimensions

Type	Description
Length	16.5cm (6.6 inches)
Width	6.4cm (2.5 inches)
Height	Full–height end bracket: 12.1 cm (4.75 inches) Low–profile end bracket: 8.1 cm (3.2 inches)

Service Messages



This appendix describes the various messages that the appliance software services generate:

- Reading DPF messages, page 148
- Reading SNMP traps, page 156
- Reading VSM states, page 158
- Setting node logging levels, page 160

Reading DPF messages

This section describes the messages generated by the RPIC Data Propagation Framework (DPF) service:

- Overview
- I/O events
- Network events
- LUN mapping events
- Host events

Overview

Click **event viewer** on the **hp OV CASA Console** window to view these messages Refer to "Using the CASA console" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for more information.

Note: The messages shown in this appendix are examples only.

Format

The following list defines the symbols that display in the error codes:

- `%d`—Indicates a decimal number.
- `%x`—Indicates a hexadecimal number.
- `[<value> | <value>]`—Indicates optional parameters.
- `1111.1111.1111`—Indicates the IP address of the appliance node.

I/O events

This section describes the messages generated by I/O events between the appliance and the storage network components, including storage arrays, routers, and switches:

- I/O timeout
- I/O failure
- Hardware device failure
- Hardware device recovery

I/O timeout

An I/O timeout, which is defined as an instance when a confirmation for a data packet transmission is not received by the appliance within a configured time period, causes the following error message to appear:

```
RPIC DPF : IOFD ioto : IO timed out
```

This message is not recorded in the event log, because additional error checking will classify the error more precisely. If this issue stems from a hardware error, a log entry describes the issue.

This message could be caused by an error condition on a networked router or switch. In this case, the appliance is operating properly, but maintenance on the networked host, router, or switch may be necessary.

I/O failure

An I/O failure, which is defined as an instance when a data packet transmission cannot be sent to the desired target, causes the following error message to appear:

```
RPIC DPF : IOFD iofd : IO failure
```

This message is not recorded in the event log, because additional error checking classifies the error more precisely. In the event that this issue stems from a hardware error, a log entry describes the issue.

This message could be caused by an error condition on a networked host, router, or switch. In this case, the appliance is operating properly, but maintenance on the networked host, router, or switch may be necessary. Other possible causes for this error include cable disconnections or misconfigured network identifiers (such as world wide names or IP addresses), or incorrect parameters in a SCSI CDB passed from a host.

Hardware device failure

When a storage device fails, it is marked as failed by the appliance and monitored for recovery.

A hardware device failure, which occurs when a storage device develops a physical defect, causes the following error message to appear:

```
RPIC DPF : IOFD dvfd : Device hardware failure : adapter %d bus %d
SCSI %d LUN %d : DPF Lun %d : Status %x Sense %x ASC %x ASCQ %x
```

This error condition is recorded in the event log.

The first four values, all expressed in decimal format, represent the identification numbers for the adapter, bus, SCSI port, and physical LUN, respectively. The fifth number, also in decimal format, repeats the physical LUN number. The final four values, all hexadecimal, represent back-end SCSI information, in the following order: SCSI Status Code, Sense Code, Additional Sense Code (ASC), and Additional Sense Code Qualifier (ASCQ). These four values may be interpreted by referencing either SCSI documentation or the vendor product specification.

Hardware device recovery

A hardware device recovery code is reported when a failed storage device, which is being monitored for health, is replaced or restored to operation. The following message appears:

```
RPIC DPF : IOFD rcvy : Device recovered : adapter %d bus %d SCSI %d
LUN %d
```

This message is entered into the event log. Variables are used in the above format because the actual values will be dependent on the specifics of the event. The four decimal numbers included in this message indicate the adapter identification number, the bus number, the SCSI port number, and the physical LUN number, respectively. This message is used for information purposes only and is not indicative of a problem within the storage network.

Network events

This section describes messages generated by status changes to nodes within the storage network:

- Network node failure
- Network node time out
- Network node recovery

Network node failure

When a network node is detected to be non-operational, the following error message is reported:

```
RPIC DPF : NETW nddn : Network node marked down : [failover |
mirror] : %d.%d.%d.%d
```

This error condition is recorded in the event log.

Either the word “failover” or “mirror” appears in the error message to indicate the relationship between the failed node and the reporting node. If the failed node was configured as a peer node to the reporting node, the word “failover” appears. If the failed node was configured as a node used in an IP mirroring operation with the reporting node, the word “mirror” appears.

Possible causes for this error are the disconnection of cables between the network nodes or a hardware failure on the peer node. There are a number of reasons that a network node may fail. If a simple diagnosis cannot be performed, contact the Technical Services Support team for assistance in performing maintenance on the failed node.

Network node time out

When a data packet transmission to a network node is not met with a transmission receipt response within a configurable period of time, a network node time out error code is generated. This error code appears in the following format:

```
RPIC DPF : NETW ndto : Network node timed out :
["failover" | "mirror"] : %d.%d.%d.%d
```

This error condition is recorded in the event log. Either the word “failover” or “mirror” appears in the error message to indicate the relationship between the failed node and the reporting node. If the failed node was configured as a peer node to the reporting node, the word “failover” appears. If the failed node was configured as a node used in an IP mirroring operation with the reporting node, the word “mirror” appears.

Possible causes for this error are the disconnection of cables between the network nodes or a hardware failure on the peer node.

Network node recovery

When a network node that was previously detected to be down or unreachable due to time out conditions, is detected to once again be operational, a network node recovery message is generated. This message appears in the following format:

```
RPIC DPF : NETW ndup : Network node marked up :
["failover" | "mirror"] : %d.%d.%d.%d
```

This error condition is recorded in the event log. Either the word “failover” or “mirror” appears in the error message to indicate the relationship between the failed node and the reporting node. If the failed node was configured as a peer node to the reporting node, the word “failover” appears. If the failed node was configured as a node used in an IP mirroring operation with the reporting node, the word “mirror” appears. This message is used for informational purposes only and does not indicate that maintenance is required on the storage network.

LUN mapping events

This section describes messages generated when the LUN mapping for a host changes:

- LUN mapping enabled
- LUN mapping disabled

LUN mapping enabled

When a LUN is mapped to a host, a LUN mapping enabled confirmation message is generated. This message appears in the following format:

```
RPIC DPF : LMAP emap : Lun mapping enabled : Lun %d : Host %d :
Visible Lun %d : HBA %d
```

This message is recorded in the event log. This message is used for information purposes only and is not indicative of a problem within the storage network.

LUN mapping disabled

When a LUN is removed from a host, a LUN mapping disabled confirmation message is generated. This message appears in the following format:

```
RPIC DPF : LMAP dmap : Lun mapping disable : Lun %d : Host %d :
Visible Lun %d : HBA %d
```

This message is recorded in the event log. This message is used for information purposes only and is not indicative of a problem within the storage network.

Host events

This section describes the messages generated by host registration or other host activity within the storage network:

- Host addition
- Host name registration
- Host removal
- Host activity on new host bus adapter (HBA)

Host addition

When a new host is configured for use within the storage network, a host addition confirmation message is generated. This message appears in the following format:

```
RPIC DPF : HOST hadd : Host added to lookup table : Index %d :
WWN %s : HBA mask 0x%x
```

This message is recorded in the event log. The first number, which is represented in decimal format, indicates the table index at which the new host has been inserted into the lookup table. The second value, which is presented in a string format, contains the world wide name (WWN) of the new host. The final value, in hexadecimal, represents the target port mask assigned to the host.

The target port mask is a bit array presented as a single value. Each bit within the mask indicates whether the host may access the target port represented by the bit. For each bit, a value of one (1) indicates that the host may connect to that target port. A value of zero (0) indicates that the host may not connect on that port. With bit ordering, bit zero represents target port zero and is the least significant bit of the byte. As an example of mask interpretation, a host that could connect to target ports zero and two would show a target port mask equal to 0x5, since bits two and zero would be set to one, and all other bits would be zero.

This message is used for information purposes only and is not indicative of a problem within the storage network.

Host name registration

When a host is registered through the appliance registration utility, a confirmation message is generated. This message appears in the following format:

```
RPIC DPF : HOST hnam : Host name registered : Index %d :
Hostname %s : OS %s
```

This message is recorded in the event log. The first number, which is represented in decimal format, indicates the table index at which the host appears within the lookup table. The second value, which is presented in a string format, contains the hostname of the new host. The final value, which also appears in string format, is a representation of the reported operating system running on that host.

This message is used for information purposes only and is not indicative of a problem within the storage network.

Host removal

When a host is removed from the storage network, a confirmation message is generated. This message appears in the following format:

```
RPIC DPF : HOST hrem : Host removed from lookup table : Index %d
: WWN %s
```

This message is recorded in the event log. The first number, which is represented in decimal format, indicates the table index at which the host had appeared within the lookup table. The second value, which is presented in a string format, contains the world wide name (WWN) of the host being removed.

This message is used for information purposes only and is not indicative of a problem within the storage network.

Host activity on new host bus adapter (HBA)

When a host accesses the appliance through a different target number than is indicated by the target port mask assigned to the host, the access is recorded. When this occurs, the target port mask for the host is updated to allow access through the new target port, and a confirmation message is generated in the following format:

```
RPIC DPF : HOST hhad : Host found on new target HBA : Index %d
: WWN %s : HBA mask 0x%x
```

This message is recorded in the event log. The first number, which is represented in decimal format, indicates the table index at which the new host has been inserted into the lookup table. The second value, which is presented in a string format, contains the world wide name (WWN) of the new host. The final value, in hexadecimal, represents the target port mask assigned to the host.

The target port mask is a bit array presented as a single value. Each bit within the mask indicates whether the host may access the target port represented by the bit. For each bit, a value of one (1) indicates that the host may connect to that target port. A value of zero (0) indicates that the host may not connect on that port. With bit ordering, bit zero represents target port zero and is the least significant bit of the byte. As an example of mask interpretation, a host that could connect to target ports zero and two would show a target port mask equal to 0x5, since bits two and zero would be set to one, and all other bits would be zero.

This message is used for information purposes only and is not indicative of a problem within the storage network.

Reading SNMP traps

After you run the `initservice slsemi,slsnmp, sltat` command when initializing the user database (see page 48), the `slsnmp` module gathers information from the sv3000 Management Server (SMS) service and formats it in SNMP.

Table 8 lists the SNMP traps generated by SMS.

Table 8: SNMP trap descriptions

Number	Type	Variables	Message
10	targetFcModeChange	targetNumber, targetFcMode	Appliance target %d changed mode to %d
11	targetStateChange	targetNumber, targetState	Appliance target %d changed state to %d
20	lunDeleted	lunNumber	Appliance LUN number %d has been deleted.
21	lunAdded	lunNumber	Appliance LUN number %d has been added
22	lunStateChange	lunNumber, lunState	Appliance LUN number %d has changed state to %d.
23	lunSizeChange	lunNumber, lunState	Appliance LUN number %d has changed size to %d.
30	lunMapDeleted	lunMapNumber, lunMapPort, lunMapHostNumber, lunMapHostName	Appliance LUN map number %d has been deleted.
31	lunMapAdded	lunMapNumber, lunMapPort, lunMapHostNumber, lunMapHostName	Appliance LUN map number %d has been added.
40	SnapShotDelete	snapShotSourceNumber, snapShotTargetNumber	Appliance snapshot with source LUN %d, target LUN %d, has been deleted.
41	snapShotAdded	snapShotSourceNumber, snapShotTargetNumber	Appliance snapshot with source LUN %d, target LUN %d, has been added.
50	localMirrorDeleted	localMirrorSourceLunNumber, localMirrorTargetLunNumber	Appliance local mirror with source LUN %d, target LUN %d, has been deleted.
51	localMirrorAdded	localMirrorSourceLunNumber, localMirrorTargetLunNumber	Appliance local mirror with source LUN %d, target LUN %d, has been added.
52	localMirrorStateChange	localMirrorSourceLunNumber, localMirrorTargetLunNumber, localMirrorState	Appliance local mirror with source LUN %d, target LUN %d, has changed state to %d.
60	remoteMirrorDeleted	remoteMirrorSourceLunNumber, remoteMirrorTargetLunNumber	Appliance remote mirror with source LUN %d, target LUN %d, has been deleted.

Table 8: SNMP trap descriptions

Number	Type	Variables	Message
61	remoteMirrorAdded	remoteMirrorSourceLunNumber, remoteMirrorTargetLunNumber	Appliance remote mirror with source LUN %d, target LUN %d, has been added.
62	remoteMirrorStateChange	remoteMirrorSourceLunNumber, remoteMirrorTargetLunNumber, remoteMirrorState	Appliance remote mirror with source LUN %d, target LUN %d, has changed state to %d.
70	caMirrorDeleted	caMirrorLocalSourceLunNumber, caMirrorRemoteSourceNumber, caMirrorLocalTargetLunNumber, caMirrorRemoteTargetNumber	Appliance cross appliance mirror with local source LUN %d, remote source LUN %d, local target LUN %d, remote target LUN %d, has been deleted.
71	caMirrorAdded	caMirrorLocalSourceLunNumber, caMirrorRemoteSourceNumber, caMirrorLocalTargetLunNumber, caMirrorRemoteTargetNumber	Appliance cross appliance mirror with local source LUN %d, remote source LUN %d, local target LUN %d, remote target LUN %d, has been added.
72	caMirrorStateChange	caMirrorLocalSourceLunNumber, caMirrorRemoteSourceNumber, caMirrorLocalTargetLunNumber, caMirrorRemoteTargetNumber, caMirrorState	Appliance cross appliance mirror with local source LUN %d, remote source LUN %d, local target LUN %d, remote target LUN %d, has changed state to %d.

Reading VSM states

Figure 9 lists the states that the VA Status Monitor (VSM) service gathers from the appliance's shared storage array.

Table 9: VSM states

Value	Name	Description
0	Ready	The subsystem is fully functional and ready to provide storage to meet the host's needs. The subsystem has completed its power up sequence prior to reaching this state.
1	Warning	The subsystem encountered an error requiring attention but the error does not prevent access to data. Possible causes of the error include a battery warning, loss of data availability, or loss of redundancy. However, the error should not cause changes to the subsystem behavior typically visible to the host. If the cause of the error is loss of data availability, you can access data that is still present. You cannot access data that is deemed unavailable.
2	Not Enough Drives	There are not enough drives to allow the system to function. The minimum number of drives depends on a number of variables.
3	No Quorum	The Part field on the Subsystem Parameters mode page is clear. There are not enough volume set member drives available to continue without partitioning the volume set.
4	No Map	The subsystem lacks internal metadata that is critical to continued operation. The data structures necessary to perform host data storage commands are lost or have not been created. The possibility of recovering lost data is remote (except when you remove and reinsert drives). You may be able to recover data using drive pass through commands, but successful recovery would be difficult at best.
5	Shutting Down	The subsystem receives a Shutdown command from the host and remains in this state until: ■ All previously accepted commands complete. ■ All policies have been deactivated. ■ The subsystem metadata has been copied to disk(s). After these tasks are completed, the subsystem enters the Shutdown state.
6	Shutdown	The subsystem has completed policy deactivation and metadata backup and is no longer performing host access commands. In this state, the subsystem cannot perform data storage commands.
7	Starting Up	The subsystem is initializing, following a power on or reset. The subsystem returns SCSI sense information that it is getting ready to process the commands it is unable to complete while in this state.
8	No Code	The controller has lost microcode. The FLASH ROM has been erased in preparation for a firmware update. This state persists until you update the firmware and reset the subsystem.
9	Reserved	Reserved

Table 9: VSM states

Value	Name	Description
10	Shutdown Warning	The subsystem was shut down but problems were detected that make it unsafe to change the system configuration (for example, you should not add or remove DIMMs).
11	Reserved	Reserved
12	Mismatched Code	The two controllers have different firmware versions and are operating independently. To resolve this error, download the latest code on the primary controller, which enables the download on the other controller.
13	Controller Mismatch	The secondary controller has a different firmware version than the primary controller. The primary controller operates in another state independently from the secondary controller that is reporting this state. To resolve this error, update the secondary controller with the firmware version that matches the primary controller.
14	Reserved	Reserved
15	Memory Configuration Mismatch	There is not a consistent configuration of useable (functional) memory installed in all controllers in the subsystem. This may be due to differences in installed components or due to failures of existing components. The controllers continue to operate independently until you identify and repair the mismatch. To resolve this error, you must be able to successfully shut down the subsystem, correct the problem and perform a reset.
16	Memory Image Mismatch	All controllers in the subsystem appear to have valid contents in the NVRAMs. However, the memory content does not match, even though the controllers all appear to belong to the current enclosure. As a result, the controller firmware cannot choose one of the images and synchronize all controllers to it. To resolve this error, you must choose a controller that has the proper image and invalidate the images on the other controllers.
17	Midplane auto-repair failure	While the subsystem is powering on, a replacement midplane assembly is discovered. However, none of the controllers contain a valid NVRAM image to properly initialize the replacement midplane. To resolve this error, you must install a controller that contains a valid NVRAM image.
18	Image repair needed	The preferred NVRAM image has uncorrectable memory errors and the other controller does not have a matching image that can be used. (It may be an older NVRAM image, an invalid image, or an image that does not belong with the enclosure.) You must remove the controller with the non-matching image and reinstall the controller that was previously paired with the controller having memory errors. Map loss occurs if a controller with a matching image is not available.
19	NV identity storage failure	An identity storage failure is detected during a reset, so the subsystem identity cannot be positively determined and no hosts will be brought online. To resolve this error, you must repair the identity storage device.
20	Dual controller communication failure	The controllers cannot communicate over the TWSI, preventing the NWAY communication channel from being enabled. Consequently, an NVRAM image cannot be selected. One of the controllers must have a hardware failure.

Setting node logging levels

The health monitor issues SNMP requests to the ProLiant insight management agents installed on the appliance nodes. The status information gathered by the health monitor displays in the **status info** section of the **hp OV CASA Console** window (See Navigating the CASA console on page 24 for more information.)

The health monitor uses a logger to assist with troubleshooting. You can modify the logging levels using the `logging_level` parameter contained in the `logger.config` file. This file is located in `c:\shell\config folder`. The default logging level is 2.

Table 10 lists the logging levels that you can set for the health monitor.

Table 10: Logging levels

Logging level	Range	Description
`None`	`0..1`	Generates the `Logger started` and `Logger stopped` entries only.
`Critical`	`2..4`	Generates the least amount of log entries.
`High`	`5..7`	Increases the number of log entries generated, compared to the previous level.
`Medium`	`8..10`	Increases the number of log entries generated, compared to the previous level.
`Normal`	`11..13`	Increases the number of log entries generated, compared to the previous level.
`Low`	`14..16`	Increases the number of log entries generated, compared to the previous level.
`Debug`	`17..`	Generates the maximum amount of log entries for debugging.

Miscellaneous Commands

This appendix describes the command line interface (CLI) commands that are intended for HP personnel use only. It describes the following topics:

- add trapdest, page 162
- build, page 163
- del trapdest, page 164
- get pollint, page 165
- get protocol_version, page 166
- get trapdest, page 167
- get version, page 168
- get vsmpollingint, page 169
- get vsmremindint, page 170
- mod cache, page 171
- mod node, page 172
- mod pollint, page 174
- mod trapdest, page 175
- mod updatedb, page 176
- mod vsmpollingint, page 177
- mod vsmremindint, page 178

Refer to the *HP OpenView Continuous Access Storage Appliance Command Line Interface Reference Guide* for more information about the CLI.

add trapdest

Syntax

```
add trapdest -ip IPADDRESS1,...,IPADDRESSN
-community COMMUNITY_NAME
```

Example

Command
`add trapdest -ip 16.129.99.70 -community private`
Purpose
Adds a trap recipient so it can receive traps from the appliance nodes.
Output
`Trap destination 16.129.99.70 added to community PRIVATE.`

build

Syntax

```
build
```

Example

Command
`build`
Purpose
Displays the version of the sv3000 Management Server (SMS) service with which `sanosadmin` is communicating.
Output
`Apr 28 2004 19:07:48, SMS Version: 4.0`

del trapdest

Syntax

```
del trapdest -ip IPADDRESS1,...,IPADDRESSN
[-community COMMUNITY_NAME]
```

Example

Command
`del trapdest -ip 196.26.99.70`
Purpose
Deletes a trap recipient so it no longer receives traps from the appliance nodes. If you do not include the `-community` parameter, the specified trap recipient is deleted from all communities.
Output
`Trap destination 196.26.99.70 deleted successfully from PRIVATE.`

get pollint

Syntax

```
get pollint
```

Example

Command
`get pollint`
Purpose
Displays the time interval (in minutes) that passes before the LUN statistics cache in the `slstat` SNMP agent is refreshed.
Output

`Polling Interval`
`------------------`
`10`

get protocol_version

Syntax

```
get protocol_version [-ina] [-sms]
```

Example

Command
`get protocol_version -ina`
Purpose
Displays the version of the Identification and Authorization (INA) service that is currently running on the local node.
Output
`INA: 2.0`

Command
`get protocol_version -sms`
Purpose
Displays the version of the sv3000 Management Server (SMS) service that is currently running on the local node.
Output
`SMS: 4.0`

get trapdest

Syntax

```
get trapdest [-community COMMUNITY_NAME]
```

Example

Command
`get trapdest`
Purpose
Displays the IP address and community name of the servers receiving traps from the appliance nodes. If you do not include the `-community` parameter, the output includes the trap recipients for all communities.
Output

`Community  IP`
`_____  _____`
`private  16.129.99.70`
`public  16.129.12.75`

get version

Syntax

```
get version
```

Example

Command
`get version`
Purpose
Displays the version of SANOS that is running on the node you are accessing.
Output

`SAN.OS Version`
`---------------`
`5.7.0.78`

get vsmpollingint

Syntax

```
get vsmpollingint
```

Example

Command
`get vsmpollingint`
Purpose
Displays the amount of time (in seconds) that the VA Status Monitor (VSM) service waits before sending the next query for status to the appliance's shared storage array.
Output

`VSM Polling Interval`
`--------------------`
`10`

get vsmremindint

Syntax

```
get vsmremindint
```

Example

Command
`get vsmremindint`
Purpose
Displays the amount of time (in seconds) that the VA Status Monitor (VSM) service waits before posting a duplicate warning event if the corresponding error condition has not changed.
Output

`VSM Reminder Interval`
`----------`
`10`

mod cache

Syntax

```
mod cache -name NAME1,...,NAMEN -refresh
where NAME is expansion, partition, ptimage, fcpmirror,
ipmirror, host, node, lun, lunmap, all
```

Example

Command
`mod cache -name all -refresh`
Purpose
Updates the specified data in SMS (the service for the user interface) by gathering the latest data from DPF (the core component of the SANOS software).
Output

`Refreshed the cache with getExpansions`
`SMS Cache has been updated`
`Refreshed the cache with getParts`
`SMS Cache has been updated`
`Refreshed the cache with getPTImages`
`SMS Cache has been updated`
`Refreshed the cache with getLocalMirrors`
`SMS Cache has been updated`
`Refreshed the cache with getRemoteMirrors`
`SMS Cache has been updated`
`Refreshed the cache with getHosts`
`SMS Cache has been updated`
`Refreshed the cache with getNodes`
`SMS Cache has been updated`
`Refreshed the cache with getLunIds`
`SMS Cache has been updated`
`Refreshed the cache with getMaps`
`SMS Cache has been updated`

mod node

Syntax

```
mod node -peer HOSTNAME | IPADDRESS
[-newname NAME | IPADDRESS] | [-secondary NAME | IPADDRESS]
```

or

```
mod node -mirror HOSTNAME | IPADDRESS [-newname NAME |
IPADDRESS ] | [-secondary NAME | IPADDRESS -proxy]
```

or

```
mod node -mgmt HOSTNAME | IPADDRESS -newname NAME | IPADDRESS
```

Note: You can only modify a node using the CLI.

Examples

Command
`mod node 11.0.0.1 -peer -newname 11.0.0.5`
Purpose
Before using this command, use the CASA setup utility to change the peer node's name or IP address. This enables the Windows operating system to identify the node by its new name or IP address. Next, use the `mod node` command to change the node's information to enable the appliance software to identify the node by its new name or IP address. Do not use this command if you are replacing an appliance node. Though not shown in this example, you can include the `-secondary` parameter to specify an alternate path for the peer nodes to communicate through the public LAN if the InterLink connection is not working.
Output
`Peer node 11.0.0.5 modified successfully.`

Caution: If you change the IP address of either appliance node, create a backup immediately. Once you change an IP address, you cannot restore appliance configuration data if you created a backup before changing the IP address. Refer to "Backing Up and Restoring Files" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* for the backup procedure.

Command
`mod node 10.0.0.3 -mirror -newname 10.0.0.1 -secondary 11.0.0.4 -proxy`
Purpose
Before using this command, use the CASA setup utility to change the mirror node's name or IP address. This enables the Windows operating system to identify the node by its new name or IP address. Next, use the `mod node` command to change the node's information to enable the appliance software to identify the node by its new name or IP address. Do not use this command if you are replacing an appliance node. You must specify a proxy path when modifying a mirror node using the CLI. The only exception is when you are using many-to-one mirroring and are modifying multiple mirror nodes from the target (Appliance D) to each source (Appliances A, B, and C). If the first mirror relationship is from Appliance D to Appliance A, you do not specify a proxy path for the subsequent relationships from Appliance D to Appliances B and C. You would enter the command as follows: `mod node 14.0.0.3 -mirror -newname 14.0.0.1` Refer to "Managing IP Mirrors" in the *HP OpenView Continuous Access Storage Appliance System Administrator's Guide* or to "Mirroring Commands" in the *HP OpenView Continuous Access Storage Appliance Command Line Interface Reference Guide* for more information.
Output
`Mirror node 10.0.0.1 modified successfully.`

Command
`mod node 12.0.0.1 -mgmt -newname 12.0.0.2`
Purpose
Modifies the public LAN connection you use to access and manage the appliance with the user interface or CLI.
Output
`Management IP 12.0.0.2 modified successfully.`

mod pollint

Syntax

```
mod pollint -interval INTERVAL
```

Example

Command
`mod pollint -interval 15`
Purpose
Sets the time interval (in minutes) that passes before the `slstat` SNMP agent refreshes the LUN statistic cache.
Output
`Polling interval 15 was successfully set in the registry.`

mod trapdest

Syntax

```
mod trapdest -oldip IPADDRESS -newip IPADDRESS
[-community COMMUNITY_NAME]
```

Example

Command
`mod trapdest -oldip 16.129.99.70 -newip 16.129.99.75`
Purpose
Modifies the IP address and/or the community name of the trap recipient. If you do not include the `-community` parameter, the community name is associated with the new IP address.
Output
`Trap destination 16.129.99.70 successfully changed to 16.129.99.75 in community PRIVATE.`

mod updatedb

Syntax

```
mod updatedb -old old_hostname -new new_hostname
```

Example

This command applies to version 5.0.4 or earlier of the appliance. If the IP address of one of the nodes changes and you are running version 5.0.4 or earlier, you must run this command to update the database with the new node information.

Command
`mod updatedb -old 14.1.195.23 -new 13.1.194.24`
Purpose
Updates the database with the new IP address specified for the node.
Output
`Database updated successfully.`

mod vsmpollingint

Syntax

```
mod vsmpollingint -interval VALUE
```

Example

Command
`mod vsmpollingint -interval 8`
Purpose
Modifies the amount of time (in seconds) that the VA Status Monitor (VSM) service waits before sending the next query for status to the appliance's shared storage array.
Output
`VSM polling interval changed to 8.`

mod vsmremindint

Syntax

```
mod vsmremindint -interval VALUE
```

Example

Command
`mod vsmremindint -interval 20`
Purpose
Modifies the amount of time (in seconds) that the VA Status Monitor (VSM) service waits before posting a duplicate warning event if the corresponding error condition has not changed.
Output
`VSM reminder interval changed to 20.`

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